



THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE

Currents

winter 2014

Pacific Fleet Supports

RANGE CAPABILITY

through

MARINE SPECIES

Monitoring

**Passive Acoustic Monitoring & Tagging on Hawaii Range Complex
Helps Safeguard Training & Advances Science**

Proven Sustainability Approaches Advance Mission at Navy Installations

Studying Military Expended Materials in the Marine Environment

**Spotlight on the New Assistant Secretary of the Navy for Energy,
Installations & Environment Dennis McGinn**



THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE **Currents**

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The Navy continues to be a world leader in marine mammal research. Much of this research has focused on underwater detection and tracking of marine mammals; marine mammal behavioral responses to sound; establishing hearing thresholds; determining species location and abundance; and mitigating the effects of underwater sound. Ongoing efforts by personnel from Commander, U.S. Pacific Fleet in the Navy's Hawaii Range Complex demonstrate the extent and complexity of the Navy's commitment to this area of scientific research.

Pacific Fleet Supports Range Capability Through Marine Species Monitoring

Passive Acoustic Monitoring & Tagging on Hawaii Range Complex Helps Safeguard Training & Advances Science

Currents (ISSN 1544-6603) is the official energy and environmental magazine of the U.S. Navy, Chief of Naval Operations Energy and Environmental Readiness Division (N45).

This magazine is an authorized publication for members of the Department of Defense. Statements made in the N45 Outlook column reflect the official policy of the Navy. The contents in the remainder of the magazine are not necessarily the official views of, or endorsed by, the U.S. Government, the Department of Defense, or the United States Navy. Inclusion of any product or service in any *Currents* feature article does not constitute an endorsement by the Navy. The Navy encourages all readers to check with the appropriate supervising authority prior to using any product or service mentioned in the magazine.

Article submissions should be submitted directly to *Currents*' Managing Editor, Bruce McCaffrey, using the *Currents* article template. A public affairs review must be completed before *Currents* management can consider an article for publication.

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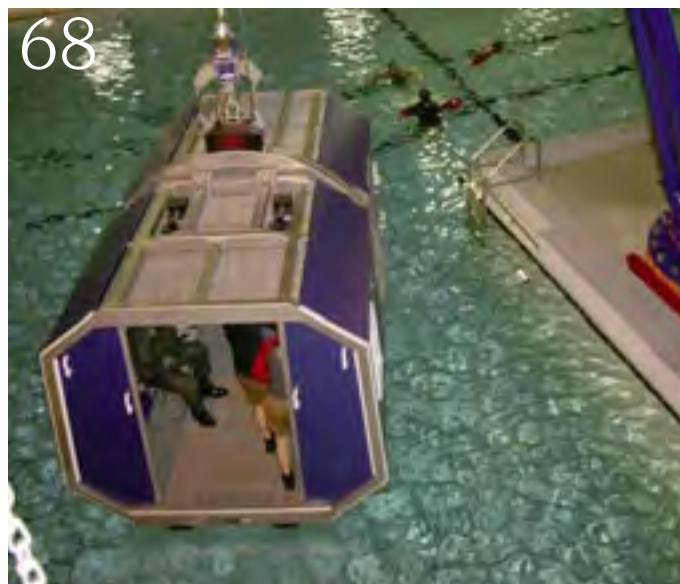
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Ocean Stewardship through Marine Spatial Planning

WELCOME TO THE winter 2014 issue of *Currents*. I'm very pleased to have the opportunity to update you in this forum about the Department of Navy's (DON) interests and activities related to the United States policies on ocean health and planning.

The Navy has a long tradition of supporting initiatives to protect the world's oceans. We are a major contributor of scientific information such as bathymetry and ocean observations, global weather/storm predictions, ocean research, and infrastructure (ships, buoys and satellites). We are a worldwide protector of freedom of navigation and a major responder to emergencies and natural disasters worldwide. In addition, we are often the largest employer in local communities and a critical economic driver for many coastal communities.

To coordinate federal activities among Departments and to establish common principals for ocean management and

addressing these activities in some parts of the country, the National Ocean Policy represents a first attempt to conduct comprehensive, integrated planning that includes the federal family, states, tribes, and other stakeholders.

Our country is struggling with escalating costs, duplicative activities, and conflicting priorities on ocean use. A comprehensive planning process, working with all stakeholders, provides an important venue for the Navy to protect national security equities while jointly working with of our federal, tribal, state, municipal, and neighborhood partners to responsibly utilize, manage and protect our ocean and Great Lakes resources.



The National Ocean Policy represents a first attempt to conduct comprehensive, integrated planning that includes the federal family, states, tribes, and other stakeholders.

conservation, President Obama in 2010 established the National Ocean Council and adopted a National Ocean Policy. In 2013, after extensive input from DON, the other National Ocean Council Departments and the public, the White House issued the National Ocean Policy Implementation Plan which lays out the steps federal agencies will take to achieve the National Ocean Policy. An important focus of the policy and the implementation plan is the development of marine plans in the nine eco-regions identified in the policy.

Marine Spatial Planning represents a new and unique opportunity for the Navy to engage with our communities, states, and regions and other ocean stakeholders early in this voluntary planning process. By increasing communications and focusing on identifying complementary and sustainable uses for these areas, we avoid conflicts, improve regulatory efficiencies, and increase ocean productivity/benefits. While there have been effective programs

DON represents the Department of Defense (DoD) on the National Ocean Council. We have established a formal executive steering group within DoD and the Joint Chiefs of Staff (JCS) comprised of senior executives and flag officers to ensure that DoD leadership is kept abreast of developments and contributes to national ocean policy implementation. Our primary objective is to ensure that operational, training, research and development, test and evaluation, environmental compliance, and homeland/national security equities are considered in developing national ocean policy and throughout the marine spatial planning process.

The DoD, with special emphasis on the Navy and the unique role of the Army Corps of Engineers within the DoD, has interests in each of the nine Regional Planning Bodies (RPB). Accordingly, we have formally designated representatives for both the DoD and Joint Chiefs for each of the RPBs. These RPB representatives participate in planning activities and coordinate activities internally to ensure

consistency throughout the DoD. DoD and Navy leadership strongly support regional planning in the coastal and marine systems to both reduce spatial and temporal conflicts and to promote healthier and more resilient coasts and oceans. Additionally, the Navy has offered to serve as the federal co-lead for both the South Atlantic and the Gulf of Mexico RPBs given the level of Navy and other military service activities in the region. Together, these two RPBs largely coincide with the Area of Responsibility for our Southeast Regional Commander.

In 2013, important progress was made in several of the planning areas. RPBs were chartered in the Northeast, Mid-Atlantic, Caribbean, and Pacific Island regions. The Northeast and Mid-Atlantic RPBs also began to develop

activities. DON recognizes that ocean governance, environmental stewardship, and resource management are inherent in our mission to defend the nation and safeguard the seas. We have long associated our warfighting mission with our responsibility to protect the natural systems upon which our quality of life depends. A fundamental military philosophy is that the national defense mission includes natural resources protection.

From both operational and societal contexts, DON understands that proper planning maximizes positive outcomes, while failing to plan leads unavoidably to conflict and discord. Marine Spatial Planning provides the Navy and DoD an efficient and effective way forward to optimize offshore uses.


Marine Spatial Planning is essential to keep increasing maritime uses from interfering with vital Navy readiness activities.

regional priorities and goals. Discussions are ongoing in the Southeast Atlantic, Gulf of Mexico, and West Coast regions. Letters of invitation from the White House were recently sent out to the Southeast Atlantic states and tribes to identify representatives to that RPB. The Great Lakes and Alaska regions will use existing structures for coordinating planning activities with federal agencies.

At the national level, headquarters staffs are coordinating with the members of the DoD and JCS team and reporting to DoD and JCS leadership. We have representatives working on each of the nine Interagency Working Groups, at the Interagency Policy Committee level, and on the Steering Committee. In 2013, we supported the National Ocean Council effort to provide public access to federal data through the www.ocean.data.gov web site. There are large sources of data that have been produced by the federal government, including the Navy, and the www.ocean.data.gov web site provides an excellent mechanism for distributing these data products. The Navy Oceanographer has the lead for systematically reviewing and sharing much of the Navy's ocean data. We also have been working jointly with other Departments on the Arctic, climate change adaptation, offshore renewable energy and inventorying ocean observing systems. Together we are making progress on the implementation plan.

Marine Spatial Planning is essential to keep increasing maritime uses from interfering with vital Navy readiness

The oceans remain our closest and most immediate frontiers, providing crucial resources for multiple sectors. They shelter, protect, and provide for the people of this country in ways that are sometimes identifiable, but just as often are immeasurable or even unrecognized. Oceans also connect us to the rest of the world through trade, commerce, and international security—all contributors to our maritime heritage. Demands on the ocean are intense and growing. We need to plan for joint, sustainable ocean uses for all sectors of American life, including the national defense. To this end, DON is positioned and committed to provide its full support to the National Ocean Council, the National Ocean Policy, and regional Marine Spatial Planning.

Finally, I am honored to introduce *Currents* readers to Mr. Dennis McGinn, the new Assistant Secretary of the Navy for Energy, Installations & Environment. He was appointed to this position on September 3, 2013. In this position, he develops policies, procedures, and strategic plans for both the Navy and Marine Corps and oversees all DON functions and programs related to installations, safety, energy, and the environment. Much more information about Mr. McGinn and insights into his priorities and perspectives are included in the spotlight interview starting on page 36 of this issue of *Currents*. 

Donald R. Schregardus
Deputy Assistant Secretary of the Navy (Environment)



Humpback whales.



Pacific Fleet Supports

RANGE CAPABILITY

through **MARINE SPECIES**
Monitoring

**Passive Acoustic Monitoring
& Tagging on Hawaii Range Complex
Helps Safeguard Training & Advances Science**

The Navy continues to be a world leader in marine mammal research. Much of this research has focused on underwater detection and tracking of marine mammals; marine mammal behavioral responses to sound; establishing hearing thresholds; determining species location and abundance; and mitigating the effects of underwater sound.

The Navy commits funding in these areas to assist environmental planners, range operators, regulatory agencies, and other stakeholders in making informed decisions as part of the permitting process for Navy at-sea training and testing activities. As the vast majority of these activities take place on ranges, the Navy commits significant funding and manpower to improve understanding of the behavior and abundance of marine mammals within and in near proximity to these areas.

Ongoing efforts by personnel from Commander, U.S. Pacific Fleet (CPF) in the Navy's Hawaii Range Complex (HRC) demonstrate the extent and complexity of the Navy's commitment to this area of scientific research. A combination of contracted and in-house research and monitoring efforts help to ensure the Navy's ability to conduct training and testing activities on HRC while protecting the well-being of marine mammals that inhabit and transit through the range.

The science derived from this monitoring also informs steps taken by commanders to minimize potential effects on marine mammals during training and testing events that involve sonar.

BACKGROUND

The U.S. Navy recently received renewed Marine Mammal Protection Act/Endangered Species Act (MMPA/ESA) permits for at-sea activities in HRC and elsewhere where the Navy has training/testing ranges and operating areas.

These activities are designed to prepare ships, submarines, aircraft and Sailors to perform the Navy's national security mission, which—as an organization that operates forward at sea 24 hours a day, seven days a week—means Navy personnel and systems are constantly interacting with the ocean environment. The original ("Phase I") permits under which Navy training and testing activities take place in these areas began to expire in January 2014, making it vital that the new ("Phase II") permits for 2014–2019 be in place prior to that time.



The Navy has made a significant investment for this purpose, committing more than \$250 million to marine mammal research and monitoring projects during the past decade.

The Chief of Naval Operations Energy and Environmental Readiness Division (OPNAV N45), CPF, U.S. Fleet Forces Command, System Commands (SYSCOM), Naval Facilities Engineering Command (NAVFAC), and Secretariat staff coordinate with environmental regulatory agencies, including the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), to ensure that environmental planning for the Hawaii-Southern California Training and Testing (HSTT) area, including HRC, and the Atlantic Fleet Training and Testing (AFTT) area remains on track.

As part of this planning process, the Navy is required to analyze the effects of its activities on the environment. Because the Navy's proposed sonar, explosives, gunnery, missile, and torpedo use,



Sperm whale.



Spinner dolphin off Kaula.

along with other training and testing actions, have the potential to impact marine life, the Navy and regulatory agencies require scientific data on how those systems affect animals that may be present in and around training and testing areas. The Navy began funding research to obtain such data in the mid-1990s, and data from that research has consistently been incorporated into its National Environmental Policy Act documentation, including environmental impact statements (EIS), used for analysis, and considered by the regulators as part of the permitting process.

The Navy strives to be good stewards of the environment both at sea and ashore. To address this responsibly, the Navy incorporates scientific data into its analysis of potential effects. The Navy has made a significant

investment for this purpose, committing more than \$250 million to marine mammal research and monitoring projects during the past decade. The results of these research efforts, which range from defining hearing thresholds for marine species and using and improving radio tagging for tracking marine mammal movement and physiology, to creating more accurate mathematical models for predicting how marine mammals perceive sound, have contributed greatly to the understanding of how human activities may affect marine life.

In an attempt to expand the available science on marine mammals and address specific regulatory requirements, CPF and NAVFAC personnel, along with professional colleagues from academia and the private

sector, have orchestrated a comprehensive marine species monitoring program under their five-year letter of authorization (LOA) from NMFS for at-sea training in the HRC. The following is a summary of the results of those monitoring efforts, highlights of the lessons learned, and insights into the recommended changes to future monitoring approaches.

COMMANDER, U.S. PACIFIC FLEET

The world's largest fleet command, the U.S. Pacific Fleet, encompasses 100 million square miles, more than half the Earth's surface. The U.S. Pacific Fleet area of responsibility in the Indo-Asia-Pacific region stretches from Antarctica to the Arctic Circle and from the west coast of the United States into the Indian Ocean. The U.S. Pacific Fleet consists of approximately

THE NAVY'S Marine Species Monitoring Program Web Site

The Navy's marine species monitoring program website serves as an online portal for information on the background, history, and progress of the program. The website also provides access to reports, documentation, data, and updates on current monitoring projects and initiatives. The "Reading Room" provides unrestricted access to many of the reference resources listed in the Comprehensive Exercise and Marine Species Monitoring Report for the U.S. Navy's Hawaii Range Complex.

Among the references available via this website are the 2012 Atlantic Baseline Monitoring Report, the Passive Acoustic Monitoring Report for the Jacksonville Range Complex, and a draft of the Navy's Strategic Planning Process for Marine Species Monitoring.

Visit www.navymarinespeciesmonitoring.us for more information.



200 ships and submarines, nearly 1,100 aircraft, and more than 140,000 Sailors and civilians.

The Navy's history in the Pacific spans more than a century and a half. Through the years, the U.S. Pacific Fleet commander's vision, mission and guiding principles have evolved as its challenges have changed. It is the mission of the U.S. Pacific Fleet to protect and defend the maritime interests of the United States in the Indo-Asia-Pacific region. By providing combat-ready naval forces and operating forward in global areas of consequence, CPF enhances stability, promotes maritime security and freedom of the seas, defends the homeland, deters aggression and when necessary, conducts decisive combat action against the enemy. In support of Pacific Command's Theater Campaign Plan, CPF will continue to work alongside their fellow Pacific Command Component Commanders to accomplish Pacific Command's mission. They will collaborate and partner with U.S. Fleet Forces Command to ensure optimum warfighting capacity and capability. CPF is ready and able to execute their mission in the Indo-Asia-Pacific and around the world.

The Navy needs to train and test in a variety of ocean environments, including littoral areas (near shore or shallow water) and the open ocean, to be prepared for deployment. Ensuring Navy personnel are prepared to go into harm's way requires rigorous, real-life training and testing in the air, on land and at sea. The Navy

uses designated air, land and ocean areas where Sailors can safely train with aircraft, vessels and sophisticated systems such as weapons, sensors and related equipment. In these designated areas, the Navy can practice in real-life situations and provide feedback on how well personnel perform.

Conducting testing activities in varying marine environments and in simulated war-fighting environments allows for accurate evaluation of system capabilities.

Test ranges provide facilities and capabilities to support Navy research, development, test and evaluation activities. Conducting testing activities in varying marine environments, such as differing water depths, seafloor types, salinity levels and other ocean conditions, and in simulated war-fighting environments allows for accurate evaluation of system capabilities.



Minke whale.

America's rebalance of forces to meet growing challenges in the Indo-Asia-Pacific makes training and testing in the U.S. Pacific Fleet area of responsibility all the more important. The U.S. Pacific Fleet has six major domestic range complexes where that training and testing occurs.

Southern California

Southern California contains the most capable and heavily used concentration of Navy ranges in the eastern Pacific Ocean. The Navy's ranges in the Southern California (SOCAL) Range Complex are essential for anti-submarine warfare (ASW) training conducted in littoral areas. The waters off SOCAL also provide realistic envi-



Southern California Range Complex.

ronmental conditions for air, surface, subsurface and amphibious training and testing activities. The SOCAL Range Complex is situated off the coast of Southern California, generally between Dana Point and San Diego, and extends more than 600 nautical miles southwest into the Pacific Ocean. The SOCAL Range Complex encompasses over 120,000 square nautical miles of sea space and includes San Clemente Island.



Hawaii Range Complex.

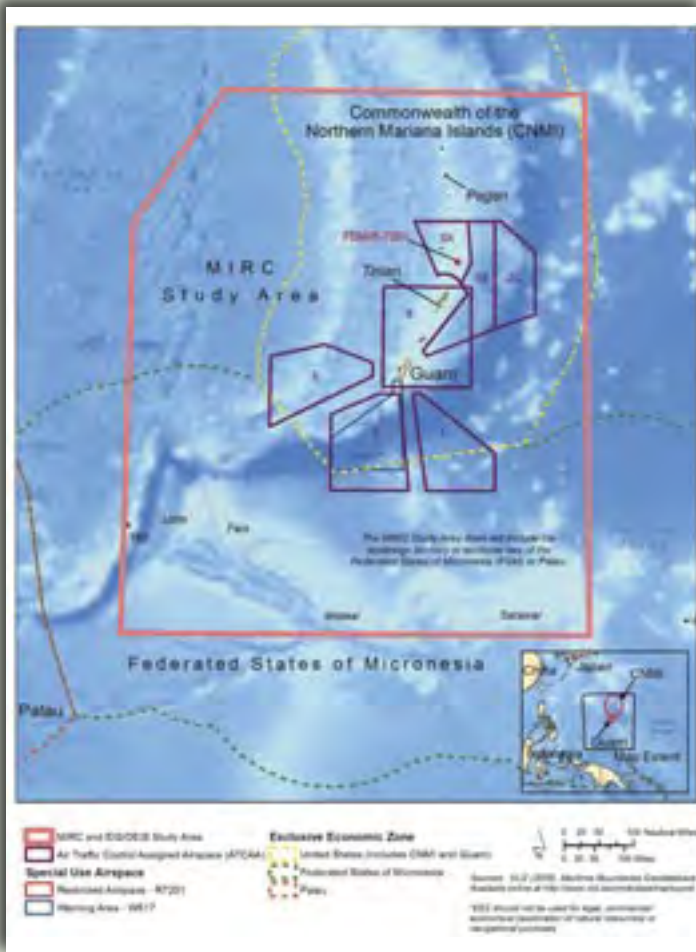
Hawaii Range Complex

Hawaii serves as an ideal training location for units deploying from the West Coast to the Western Pacific Ocean or Southwest Asia. Range capabilities in Hawaii provide an opportunity for deploying units to train in multiple warfare areas. The large training area available within the HRC allows training to take place on a geographic scale that replicates potential real world events. There are also large remote areas within the range complex that provide ideal settings for long-distance tests and multinational exercises, such as the biennial Rim of the Pacific training exercise. The HRC includes more than 235,000 square nautical miles of the Hawaii Operating Area (including the Pacific Missile Range Facility (PMRF)).

Mariana Islands Range Complex

Located in the Western Pacific, the Mariana Islands Range Complex (MIRC) encompasses more than 500,000 square nautical miles of ocean around Guam and the Common-

wealth of the Northern Mariana Islands. The MIRC serves as the principal U.S. military training and basing venue in the Western Pacific, with the unique capability and capacity to support required current, emerging, and future training. Because of its proximity to forward-deployed forces in the Western Pacific, it provides the most economical location for forward-deployed U.S. forces to train.



Mariana Islands Range Complex.

Northwest Training Range Complex

The Navy historically has used areas in the Pacific Northwest for training and testing activities, some dating back to 1914. The Northwest Training Range Complex (NWTRC) consists of two primary components: the Offshore Area and the Inshore Area. The at-sea portion of the NWTRC extends 250 nautical miles from the shores of Washington, Oregon and Northern California, encompassing more than 120,000 square nautical miles. The Inshore Area of the range complex includes all air, land, sea and undersea ranges and operating areas inland of the coastline,



Northwest Training Range Complex.

including Puget Sound. The Inshore Area extends east to Idaho, but does not include Oregon or California.

Keyport Range Complex

The Keyport Range Complex is in the Pacific Northwest, providing protected, deep, and secure marine waters for testing, ASW, undersea warfare, and mine warfare. It provides a full spectrum research, development, test and evaluation, engineering, and fleet support center for



Keyport Range Complex.

submarines, autonomous underwater systems, and offensive and defensive weapon systems associated with undersea warfare. Four sites make up the Keyport Range Complex, including Keyport Range, Dabob Bay Range Complex, Quinault Range, and Canadian Forces Maritime Experimental and Test Range. All sites provide variable oceanographic properties in marine waters to a depth of 1,200 feet. This variation allows sequentially more challenging environments for testing from sheltered and inland marine waters to open-ocean and surf zone. Naval Undersea Warfare Center Division, Keyport provides recovery of all systems for reuse and analysis at all these sites.

Gulf of Alaska

The Navy trains a few weeks each year in the Gulf of Alaska (GOA) to prepare Sailors and other military personnel for global conflicts and homeland defense/homeland security activities. The Alaska training occurs primarily in the 42,146 square nautical miles of the

Temporary Maritime Activity Area. Complex oceanographic conditions there create a challenging environment for ASW training. The location, size and unique environment of the Alaska Training Areas provide the Navy with a wide range of training opportunities with varying degrees of complexity and diversity, all of which enhance the quality of military training.

The U.S. Pacific Fleet staff reports administratively to the Chief of Naval Operations and operationally to the U.S. Pacific Command, headquartered at nearby Camp H.M. Smith. Commands that fall directly under the U.S. Pacific Fleet include “type” commands for surface ships, submarines and aircraft as well as Navy expeditionary and construction. Operational commands that report directly to the U.S. Pacific Fleet include Third Fleet in the Eastern Pacific and Seventh Fleet in the Western Pacific and Indian Ocean.

For more information about the U.S. Pacific Fleet, visit www.cpf.navy.mil.

MARINE MAMMAL MONITORING & RESEARCH IN THE HRC

Navy monitoring of marine mammals and sea turtles around Hawaii has produced solid scientific results and important lessons in monitoring methods. “Monitoring on the HRC is primarily focused on training events,” said Julie Rivers, CPF’s natural and marine resources program manager. “In addition, we’ve capitalized on the hydrophones at PMRF for our projects.”

The HRC encompasses more than 200,000 square nautical miles of surface and subsurface ocean areas around the main Hawaiian Islands and is home to 24 species of whales and dolphins and one seal species. The Navy has conducted diverse monitoring activities in the HRC, greatly expanding the body of knowledge on marine species distribution, habitat use and behavior.

The Navy’s marine species monitoring approach has evolved as past efforts demonstrated what various monitoring methods can and cannot reasonably achieve. Generally speaking, four “platforms” have been used to collect monitoring data in the HRC: aircraft, surface vessels, data tags (satellite and cell phone) and passive acoustic monitoring (PAM) devices.

The timeline on the following pages is a graphical representation of progression of monitoring efforts and related events in HRC from 2005 to 2013.



Gulf of Alaska.



Bottlenose dolphin.

2005

Vessel/Shore Surveys

Pilot study: Sailboat survey for deep diving cetaceans off Oahu, Kauai & Niihau

- *Notable sighting: Minke whale observed southwest of Kauai*

Acoustic Surveys

Sailboat survey for deep diving cetaceans off Oahu, Kauai & Niihau

- *Minke whales acoustically localized on Pacific Missile Range Facility (PMRF)*

2006

Aerial Surveys

Surveys of channels between Kauai & Niihau and Hawaii Island & Maui during Rim of the Pacific (RIMPAC)

Vessel/Shore Surveys

Shore surveys from Kauai & Hawaii Island during RIMPAC

- *Notable sighting: Leatherback turtle near Hawaii Island*

Acoustic Surveys

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2007

Aerial Surveys

Surveys off Oahu and Molokai during Submarine Commanders Course (SCC) & Undersea Warfare Exercises (USWEX)

Vessel/Shore Surveys

Sailboat survey off Oahu, Molokai, Lanai, Maui, & Hawaii Island

Vessel survey off Oahu and Molokai during USWEX

- *Notable sightings: Sei whales and Bryde's whale*

Acoustic Surveys

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2008

Aerial Surveys

Surveys south of main Hawaiian Islands during USWEX

Survey off Kauai & Niihau during RIMPAC

Survey south of main Hawaiian Islands during SCC

- *New technique: Orbital survey accompanying Navy vessel*

2008 CONTINUED

Vessel/Shore Surveys

Vessel survey off Kauai & Niihau during RIMPAC

Acoustic Surveys

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2009

Aerial Surveys

Survey off Kauai & Niihau during SCC (2x)

Survey off Oahu during Unit Level Training (ULT) & underwater detonation (UNDET)

Vessel/Shore Surveys

Large vessel survey of Hawaiian waters (National Marine Fisheries Service (NMFS))

Marine Mammal Observers (MMO) on Navy vessel during SCC (2x)

UNDET monitoring

- *First monitoring of UNDET in HRC on Pu'uloa Range*

Vessel survey Kaula Islet

Acoustic Surveys

Large vessel survey of Hawaiian waters (NMFS)

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2010

Aerial Surveys

Survey during SCC

Sinking exercises during RIMPAC

Coastline survey during Koa Kai

Vessel/Shore Surveys

MMOs on Navy vessel during ULT, SCC & Koa Kai

- *New study: Navy lookout effectiveness study initiated*
- *Notable sighting: Fin whale observed by ONR contractor*

Vessel survey Kaula Islet

UNDET

Vessel survey off Kauai & Niihau during RIMPAC

- *First monitoring task order under the HDR monitoring IDIQ contract*

Vessel survey south of main Hawaiian Islands during Koa Kai

- *Notable sighting: Sei whale near Perret Seamount*

Tagging

Hawaiian monk seals tagged on Kauai, Oahu, & Molokai

2010 CONTINUED

Acoustic Surveys

Passive Acoustic Monitoring (PAM) before & after SCC

Two Ecological Acoustic Recorders (EAR) deployed off Puuloa UNDET range (Oahu)

Two EARs deployed off Niihau

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2011

Aerial Surveys

Surveys during SCC & USWEX

Vessel/Shore Surveys

MMOs on Navy vessel during SCC, USWEX & Koa Kai

Vessel survey Kaula Islet & Kauai

Vessel survey Kaula Islet

UNDET (3x)

- *Notable sighting: Monk seal eating large fish*

Tagging

Hawaiian monk seals tagged on Kauai, Oahu & Molokai

Tagging Kaula Islet & Kauai

Tagging PMRF

- *Notable sighting: Killer whales on PMRF*
- *First tags ever deployed on rough-toothed dolphins anywhere*

Acoustic Surveys

PAM before, during, & after SCC

Marine Mammal Monitoring on Navy Ranges (M3R) at PMRF

- *First implementation & coordination of M3R system with tagging on PMRF*

EAR deployed near Kaula Islet

Three EARs deployed around Niihau

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

2012

Aerial Surveys

Surveys during & after SCC

Vessel/Shore Surveys

Vessel survey PMRF

- *Notable sighting: Minke whale observed on PMRF*

MMOs on Navy vessel during SCC

Vessel survey Kaula Islet

2012 CONTINUED

Tagging

Tagging PMRF (2x)

- *First visual confirmation of acoustically detected Blainville's beaked whales on PMRF*

Tagging analysis

Monk seal tag analysis

Lanai tagging

- *Notable sighting: Fin whale*

Acoustic Surveys

M3R at PMRF (2x)

EAR deployed near Kaula Islet

Three EARs deployed around Niihau (2x)

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

EAR data analysis

Beaked whale passive acoustic monitoring analysis

2013

Aerial Surveys

Surveys during SCC

High resolution bird surveys at Kaula island for Coastal Zone Management Act compliance

- *Notable sighting: 11 monk seals photographed at Kaula Island*

Vessel/Shore Surveys

MMOs on Navy vessel during SCC

UNDET

- *Notable sighting: Second sighting of monk seal 'Rocky' at Puuloa*

Tagging

Tagging PMRF & Lanai (2x)

Tagging analysis

Acoustic Surveys

M3R at PMRF (2x)

Baseline acoustic recording two days a month at PMRF using instrumented hydrophone range

EAR data analysis



False killer whale.



An Ecological Acoustic Recorder (EAR). The actual recording device is inside the tube surrounded by Syntactic foam. This unit was deployed near Kaula island in 2011.

Each of the four monitoring platforms is depicted on a separate timeline within the graphic above. Each platform employs various monitoring methods to collect data on marine species at varying scales of time and space. The platform and methodology are chosen based on monitoring requirements, which are in turn driven by the scientific questions the Navy is striving to answer.

Monitoring Platforms

In the early years, shipboard and aerial visual surveys were the primary methods of data collection. Acoustic monitoring had only been performed for Navy projects using towed hydrophone arrays in conjunction with vessel surveys. In calendar year 2010, the program diversified—tagging commenced with cell phone tags deployed on Hawaiian monk seals and acoustic monitoring used the hydrophone arrays at PMRF as well as autonomous moored recording devices (a model known as the Ecological Acoustic

Recorder (EAR)). (Note: Cell phone tags are line-of-sight radio tags much like FM radio tags or walkie-talkies with a range of 10 to 20 miles. Satellite tags talk to satellites and can send and receive data beyond the 20-mile range of a cell phone tag.) Tagging and acoustic monitoring now provide monitoring data and are relied upon in addition to vessel visual surveys. Over time, aerial visual survey methods have been used less frequently.

Monitoring activities occur before, during and/or after training and testing events on the HRC. Four monitoring platforms and methods, as well as specific efforts during select training events, are described below.

Tagging and acoustic monitoring now provide monitoring data and are relied upon in addition to vessel visual surveys.

Aerial Surveys

Aerial surveys have been used for systematic surveys over the open ocean, shoreline surveys and within elliptical orbits in the path of a Navy warship. Systematic survey patterns can sample the distribution of species across a large area but cannot reveal patterns of species presence over time unless the



Green sea turtle.



A pair of green turtles mating near Pearl Harbor, observed after underwater detonation (UNDET) monitoring on the Puuloa UNDET range.

Morgan Richie

same survey pattern is repeated frequently at short time intervals. Because the timing of monitoring is generally linked to Navy training schedules instead of regular sampling intervals in the HRC, it was determined that regular systematic surveys would not achieve Navy monitoring goals.

The aerial shoreline survey methodology was initially employed to assess whether animals were stranding on remote shorelines following training

events. Although no training event-related strandings were observed, it quickly became clear that aerial shoreline surveys from aircraft provided an efficient method for sampling species that aggregate in shallow water near the coast. In Hawaii, this method has been effective for assessing populations of Hawaiian monk seals on beaches and sea turtles, particularly in areas with sandy bottoms.

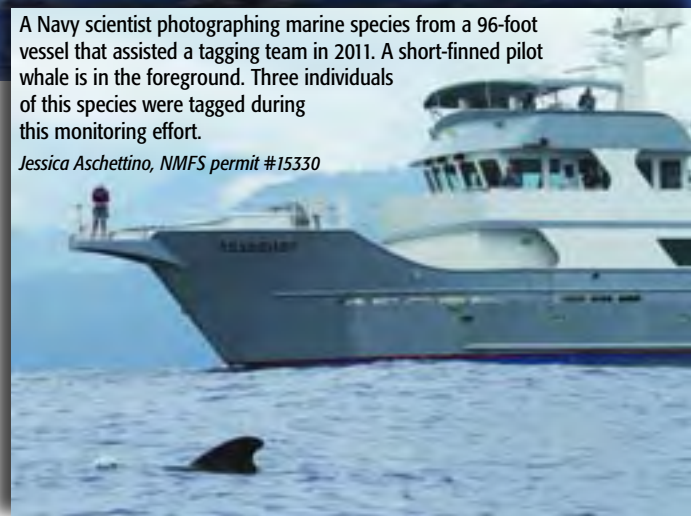
Surveying in an elliptical pattern in the path of a destroyer has only been attempted in the HRC due to the logistical challenges this method presents. Because the volume of commercial and private aviation traffic is relatively low near PMRF, PMRF range controllers are able to direct altitude separation of survey aircraft and Navy aircraft with enough safety margin to make this survey method viable.

During elliptical orbits, an aerial survey team flies in front of a Navy ship that is participating in ASW training and transmitting mid-frequency active sonar (MFAS). The orbits extend from approximately 200 meters in the front of the ship out to approximately 2,500 meters, over a circle with a diameter of 5 kilometers.



A Navy scientist photographing marine species from a 96-foot vessel that assisted a tagging team in 2011. A short-finned pilot whale is in the foreground. Three individuals of this species were tagged during this monitoring effort.

Jessica Aschettino, NMFS permit #15330



Pilot whale.

The aerial team searches for marine species in the vicinity of the Navy vessel in order to observe the animal's behavior as the ship approaches and supplies data that would allow acousticians (during subsequent analysis) to estimate the range of sound the animals received (if any) from MFAS.

When a marine mammal or sea turtle is sighted within approximately 5 km (2.7 nautical miles) of a ship involved in a training event, the animal's initial location is noted and the survey plane commences a behavioral focal follow protocol. (Note: A focal follow is the continuous tracking of a specific individual or group to gather a detailed chronology and description of behaviors.) The focal follow session is documented in each case using a high-definition, hand-held video camera with audio input from the airplane's intercom system. The goal is to circle the focal group or animal for as long as possible, documenting each behavior (e.g., blow, breach, fluke-up dive). Videos are later transcribed with time stamps for each event using a behavioral ethogram (a comprehensive inventory of the behavior of the animal).

Surface Vessels

Monitoring from surface vessels takes place on vessels ranging from 19-foot rigid-hull inflatable boats (RHIB) to large Navy warships. During some Navy training events, Marine Mammal Observers (MMO) embark on a Navy surface warship. The MMOs are trained biologists who specialize in identifying species of marine mammals and observing their behaviors. They are separate from Navy lookouts or watchstanders, who are responsible for spotting and reporting all types of surface contacts at sea. During training events that

employ layered monitoring methodologies simultaneously (such as the Submarine Commanders Course (SCC)), MMOs are aboard the same surface ship to which an aerial survey aircraft is assigned. Along with the lookouts, the MMO team helps keep the ship's bridge informed. The observers also relay animal sighting information to the aerial survey team via radio. Observers on both small and large surface vessels can monitor very small areas for changes in marine species presence over short periods of time. Primary goals for small boat surveys have been to gather data on habitat use and movements of marine mammals near PMRF, provide species verification for acoustic detections under the Marine Mammal Monitoring on Navy Ranges (M3R) program, and deploy satellite tags prior to specific training events.

The aerial team searches for marine species in the vicinity of the Navy vessel in order to observe the animal's behavior as the ship approaches.

Monitoring Tags

Tagging is an element of the monitoring program in HRC that allows researchers to generally localize animal movements, in some cases including dive patterns. Satellite tags have been deployed on odontocetes and cell phone tags have been



A breaching juvenile Blainville's beaked whale. This individual breached repeatedly on PMRF near a Navy monitoring vessel in 2012.
Mark Deakos, NMFS permit #14451



Hawaiian monk seal eating a large fish on the Puuloa UNDET range.

Robert Uyeyama

Hawaiian monk seal.

recent efforts over the past decade, this group of animals had not been well-studied. Satellite tag data is greatly increasing the knowledge base on the many species which have now been tagged.

Passive Acoustic Monitoring

PAM involves several different methodologies on HRC, including the instrumented range at PMRF and deployment of long-duration autonomous recorders. The PMRF instrumented range off

West Kauai includes 199 functional bottom-mounted hydrophones arrayed across three water depth categories. The hydrophones record sounds in the environment over hundreds of square miles. The same technology that supports tracking undersea vehicles is well suited to identifying and localizing the clicks and vocalizations of many marine mammals.

In 2012, the range hydrophones at PMRF were further enhanced with the addition of the M3R system, greatly expanding the range's monitoring and research capability. The M3R system processes acoustic signals from the hydrophones, and on-shore acousticians observe and characterize species vocalizations using the M3R system software. When the M3R system was installed, it

deployed on pinnipeds (Hawaiian monk seals). (Note: Odontocetes are dolphins and whales with teeth and include false-killer whales and pilot whales. Mysticetes are whales with baleen and no teeth and include blue whales, right whales and gray whales.)

Cell phone tags are providing new information on the critically endangered Hawaiian monk seal—a species found only in Hawaii and whose population has been declining in recent decades. While the majority of the population (about 900 individuals) resides in the Northwestern Hawaiian Islands, a smaller population of about 200 animals resides in the main Hawaiian Islands. Cell phone tags deployed on several of these individuals have provided important data on these animals' movements in and around the main Hawaiian Islands.

Cetacean tagging efforts in the HRC have focused on odontocete cetaceans, which, with the exception of the seasonally occurring humpback whales, are encountered with much greater regularity than mysticete cetaceans (baleen whales). Despite the presence of 17 species of odontocete cetaceans in and around the HRC, until

The same technology that supports tracking undersea vehicles is well suited to identifying and localizing the clicks and vocalizations of many marine mammals.

provided the additional research potential of localizing a marine mammal that is repeatedly vocalizing within the area of the range. On a limited basis, this utility allows the user to monitor range activity of vocalizing cetaceans and to view spectrograms for hydrophones of interest. (Note: Only



Humpback whale.

submerged and repetitively vocalizing/clicking animals can be localized. A spectrogram is a visual representation of sound showing the frequency, intensity, duration and variation of a sound over time. Using spectrograms, a trained analyst can, in most cases, determine the nature of the received sound.) Because the HRC is much larger than the instrumented PMRF range, the Navy also has collected or obtained analysis of PAM recordings from a number of autonomous buoys at various locations around the main Hawaiian Islands. Analysis of autonomous buoys outside of PMRF provides snapshots of habitat use and species distribution in a given area and at a given depth.

Integrated Comprehensive Monitoring Plan & Implementation

As the timeline shows, the use of four monitoring platforms has evolved over the life of the Navy's monitoring program. It reflects the broader monitoring framework encompassed

within the Navy's Integrated Comprehensive Monitoring Plan (ICMP). That program was developed in direct response to permitting requirements for the Navy's ranges, requirements that are established in Marine Mammal Protection Act (MMPA) final rules and Endangered Species Act (ESA) biological opinions. The four primary objectives of the ICMP are to:

1. Monitor and assess the effects of Navy activities on protected marine species.
2. Ensure that data collected at multiple locations are collected in a manner that allows comparison between and among different geographic locations.
3. Assess the efficacy and practicality of monitoring and mitigation techniques.
4. Add to the overall knowledge base of protected marine species and the effects of Navy activities on these species.

As required under the MMPA, the Navy is responsible for monitoring and reporting on activities involving active sonar and/or detonations from underwater explosives. The ICMP provides the overarching framework for coordination of the Navy's monitoring program. The Navy's ICMP is evaluated through an annual adaptive management meeting where personnel from the Navy and NMFS jointly consider prior year goals, monitoring results, and related scientific advances to determine if modifications are needed to more effectively address monitoring program goals. The Navy and NMFS also consider input from the Marine Mammal Commission as part of this process.

The HRC monitoring plan is a range-specific plan that was created by CPF staff in concert with the ICMP. The annual HRC plans provide guidance for CPF's selection of field methodologies used to satisfy monitoring requirements.

Compliance Monitoring Summary

From 2009 to 2013, CPF maintained compliance with the annual metrics outlined in the HRC monitoring plan and as amended in each annual LOA renewal request. (See the table below for a summary of the evaluation metrics and monitoring efforts from 2009 to 2012 contained in the HRC monitoring plan.)

CPF designed the first HRC monitoring plan (finalized in December 2008) around metrics that required specific quantities of visual survey hours or deploying a specific number of tagging devices per year. The plan was designed to gather data to help address a series of scientific questions posed by NMFS. CPF used this approach through 2013.

Over time it became clear that these metrics were not consistently good indicators of success for monitoring. As an example,

when training events happened under less-than-optimal survey conditions, marine mammal monitoring during those events did not consistently yield useful data. The rigidity of the metrics occasionally led to monitoring during surveys being conducted in poor conditions in order to meet annual monitoring plan commitments.

In February 2009, the Navy and NMFS held the first annual adaptive management meeting as required under the Navy's MMPA/ESA permits. The meeting provided an opportunity to review monitoring results, consider new scientific studies, and discuss lessons learned. As part of the Navy's ICMP, the Navy and NMFS agreed to a set of general research questions which future Navy

MONITORING PLAN METRICS ACCOMPLISHED ANNUALLY

Study Type	2009	2010	2011	2012
Visual Surveys	104 hours aerial during ASW and during three explosives events 40+ hours vessel during ASW and during two explosives events	163.8 hours of aerial and vessel surveys	299.8 hours of aerial and vessel surveys	More than 232 hours of aerial and vessel surveys
Marine Mammal Observers	80 hours during ASW and 40 hours during explosive events	239.3 hours during two ASW events and six explosive events	Three ASW events and four explosive events	Two ASW events and 10 explosive events
Tagging	Tags ordered for Pacific Islands Fisheries Science Center (PIFSC) deployment	11 Hawaiian monk seals tagged	10 Hawaiian monk seals tagged Five attempted tag deployments on cetaceans, four successful Continuing analyses of tag data from Fiscal Year 2010 monitoring	15 attempted tag deployments on cetaceans, 14 successful
Passive Acoustic Monitoring	Contracted for use of four High-frequency Acoustic Recording Packages to be deployed in 2010 Gathered and analyzed data from PMRF instrumented hydrophone range two days per month	Deployed four EARS Funded baseline analysis of archived PIFSC acoustic data Gathered and analyzed data from PMRF instrumented hydrophone range two days per month Prep for early award for analysis of archived EAR data	Deployed four EARS Analyzed archived data from two EARS Gathered and analyzed data from PMRF instrumented hydrophone range in conjunction with SCC plus two days per month	Deployed four EARS and 18 sonobuoys Analyzed data from eight historical EAR deployments Gathered and analyzed data from PMRF instrumented hydrophone range in conjunction with SCC plus two days per month



The first confirmed sighting of a Bryde's whale in Hawaiian waters, north of Oahu in 2007. There are three rostral ridges on this species.
Courtesy of CETOS Research Organization, NMFS permit #1039–1699.

monitoring efforts would try to answer. Adaptive management meetings were also held in the fall of 2010, 2011 and 2012.

A series of monitoring meetings in 2010 refined the approach for the Navy's monitoring program. With input from the regulatory agencies and the marine science community, the Navy critically evaluated region-specific monitoring plans as well as the ICMP. As part of that process, the Navy established a Scientific Advisory Group (SAG) of leading marine mammal scientists with the task of developing recommendations for a Navy monitoring strategic plan. In May 2011, the SAG proposed more specific research questions to focus monitoring efforts on filling key data gaps. CPF established a regional SAG for Hawaii in June 2011, and in November 2013 research questions from the regional SAG were integrated into a new regional monitoring plan. With concurrence from NMFS, Navy monitoring on HRC from 2013 forward will use research questions rather than metrics based on visual survey hours and quantities of tags deployed.

Evolution of Methodology & the Submarine Commanders Course

The evolution of the HRC marine species monitoring program is apparent on the visual timeline on pages 16 and 17.



A Sei whale observed north of Oahu in 2007.
Courtesy of CETOS Research Organization, NMFS permit #1039–1699.

Until 2010, a major focus of monitoring efforts in HRC was the Rim of the Pacific (RIMPAC) training exercise. The large multinational training event occurs every other year, and several monitoring efforts were scheduled in conjunction with the month-long exercise. But RIMPAC—partly because of its wide geographic footprint and the difficulty of obtaining information from many international participants—did not provide a reliable venue to collect useable data. Consequently, the Navy turned its focus to more dependable regular training events that had also been the subject of some monitoring. The SCC, a multi-unit training event that occurs regularly on PMRF, is an appropriately sized event, consistently scheduled and includes the regular use of mid-frequency active sonar.

The SCC is well-suited for aerial monitoring based upon the number of assets involved and because the surface ship portion occurs at the PMRF instrumented hydrophone range. This event allows for range control to route the aerial survey aircraft away from the Navy P-3s and helicopters to avoid collision.

Multiple platforms and monitoring methods were combined and expanded over the monitoring events from 2009 to 2012. The first SCC monitoring events included aerial surveys, MMOs embarked on a Navy surface ship during the event and acoustic recordings collected from the PMRF hydrophones before and after the event. In 2011, special approval was obtained for collection of acoustic recordings during the event. In 2011 and 2012, cetacean tagging aided by the newly installed M3R system was added to the other methods. Once compiled and analyzed, data from satellite tagged odontocetes had the potential to contribute to monitoring by showing movements of individuals before, during and after training events, and provide further insight with regards to the movements of the animals in relation to active Navy assets. As a result, the layers of monitoring methodologies applied concurrently or near-concurrently included:

- Aerial visual surveys, orbiting in the path of a Navy surface ship conducting ASW training.

Continued on page 28.

Marine Species Research & Monitoring Hierarchy

The Navy's ICMP provides the overarching organizing framework for the Navy's research and monitoring efforts to better understand and monitor the potential impacts of anthropogenic sound on marine species. Those efforts are coordinated among the following programs:

1. The Office of Naval Research's (ONR) Marine Mammals and Biology (MMB) Program
2. The Living Marine Resources (LMR) program sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division (OPNAV N45)
3. The Navy's Fleet-sponsored marine species monitoring programs

THE MARINE MAMMALS AND BIOLOGY PROGRAM

The MMB program is the Navy's basic (6.1) and early applied (6.2) research program on marine mammals and biology and is managed at ONR by Dr. Mike Weise. The MMB program sponsors research to better understand and characterize the potential effects of Navy sound exposure on marine mammals in an effort to minimize disruption to marine mammals and other protected marine life during naval activities. MMB program topic areas include the following:

1. **Monitoring**
Development of resources to monitor and mitigate potentially adverse interactions between naval activities and the marine environment.
2. **Integrated Ecosystems Research**
Investigations of the overall ecology of marine mammals including the development of sensors and tags that can provide the data needed to understand the relationship between marine mammals and their environment.
3. **Effects of Sound**
Investigations of the effects of sound on marine life including understanding how they hear, Behavioral Response Studies (BRS) to understand how anthropogenic sound affects their behavior, understanding their physiology including how they have evolved for diving and how they respond to stress, and what are the population consequences of acoustic disturbance.
4. **Models & Databases for Environmental Compliance**
Investigations into predictive modeling and quantitative risk assessment for anthropogenic sounds in the marine

environment, and other tools to support environmental compliance efforts and decision making.

MMB Principal Investigators include members of the academic community, government laboratories, and private industry. The MMB program works closely with federal, state, and non-U.S. agencies charged with conservation and management of the marine environment to better facilitate the dissemination of program results.

MMB program-developed technologies and/or capabilities that have potential application for the Fleet monitoring programs can be transitioned to the (6.4) LMR program for demonstration and validation, or even directly to the Fleets depending on their specific requirements. For example, the MMB program has invested heavily in persistent, autonomous, passive acoustic monitoring of marine mammals from a variety of platforms that can complement and expand existing legally mandated Fleet monitoring approaches. Also, the MMB program helped to pioneer BRSS, which simultaneously tag whales and expose these animals to low level sonar to better understand and characterize their responses. These responses are the basis for threshold criteria used in all risk assessments for EISs that enable Navy training exercises.

For more information about ONR's MMB program, visit www.onr.navy.mil/en/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322/Marine-Mammals-Biology.aspx.

THE LIVING MARINE RESOURCES PROGRAM

The Navy's late stage applied research (6.4) LMR program is managed for OPNAV N45 at the Naval Facilities Engineering and Expeditionary Warfare Center by Dr. Bob Gisiner. The LMR program seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. This mission is accomplished through the following five primary focus areas:

1. Providing science-based information to support Navy environmental effects assessments for at-sea training and testing.
2. Improving knowledge of the ecology and population dynamics of marine species of concern.
3. Developing the scientific basis for the criteria and thresholds to measure the biological effects of Navy-generated sound.

4. Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences of underwater sound (as opposed to tactical applications of underwater sound or propagation loss modeling for military communications or tactical applications).
5. Developing technologies and methods to mitigate and monitor environmental consequences to living marine resources resulting from naval activities on at-sea training and testing ranges.

The LMR program is advised by an executive committee, the Living Marine Resources Advisory Committee (LMRAC), made up of representatives from the major Navy stakeholder organizations involved in this environmental issue, including U.S. Fleet Forces, CPF, the Navy Systems Commands (Naval Air Systems Command, Naval Facilities Engineering Command (NAVFAC), Naval Sea Systems Command, Space and Naval Warfare Systems Command), as well as ONR and the Office of the Secretary of the Navy for the Environment. Members of the LMRAC are actively involved in the support of basic research that provides new opportunities for LMR funding (from ONR and elsewhere) and/or they are actively engaged in the application of LMR work products to the preparation of National Environmental Policy Act and related risk analyses related to Navy environmental compliance documentation. LMRAC members are also engaged with the application of LMR new technologies to risk mitigation and monitoring requirements developed adaptively with the appropriate regulatory authority through the Navy's ICMP that is coordinated by OPNAV N45.

An example of such transitions from basic research through applied research and application include the development of hearing-based risk criteria such as Temporary Threshold Shift criteria and hearing weighting functions for different frequencies of sound relevant to Navy sound sources.

Similarly, data about the behavioral responses of marine animals to Navy sound sources are being derived from a methodology pioneered by ONR via the BRS which is currently jointly funded and managed by the MMB and LMR programs, with data transitioning directly to the user community via publication in peer-reviewed scientific literature. The M3R system, a similar project that uses existing acoustically instrumented Navy ranges and is led by personnel from the Naval Undersea Warfare Center in Newport, Rhode Island, was pioneered by ONR and is currently undergoing demonstration and evaluation under LMR support for eventual transition to Fleet ownership as an adjunct to the normal tactical operations of the instrumented ranges.

For more information about the LMR program, visit www.lmr.navy.mil.

THE NAVY'S FLEET-SPONSORED MARINE SPECIES MONITORING PROGRAMS

As part of the regulatory compliance process associated with the MMPA and the ESA, the Navy is responsible for meeting specific requirements for monitoring and reporting on military training activities involving active sonar and underwater detonations from explosives and explosive munitions. The Fleet marine species monitoring program is a direct outcome of MMPA Letters of Authorization issued to the Fleet for each range complex. The Fleet uses CNO's ICMP as an overarching guide, tailoring each range complex monitoring plan specific to regional objectives. Input from local researchers is solicited by NAVFAC for use in development of those objectives which are provided in annual reports to NMFS as well as discussed at an annual adaptive management meeting with NMFS. (See the Navy's marine species monitoring web site at www.navymarinespeciesmonitoring.us for more information.)

Julie Rivers oversees the marine species monitoring efforts described in this article and in the Mariana Islands Range Complex. Her colleague, Chip Johnson, oversees similar efforts on other Pacific range complexes (including the Southern California, Gulf of Alaska and Northwest Training and Testing ranges). U.S. Fleet Forces Command has a parallel effort for Atlantic monitoring efforts which is managed by Dave MacDuffee. Fleet personnel are ultimately responsible for the proper application of the results from the above mentioned research programs within the operational Navy's monitoring programs. NAVFAC biologists provide subject matter expertise, contracting and project oversight for most of the field efforts.

The Fleet monitoring programs typically use tools that have already been developed under ONR's MMB program and field tested by OPNAV N45's LMR program. For example, most of the autonomous passive acoustic monitoring devices that the Fleet is currently using were developed and tested under R&D funding from ONR. This was followed by years of field deployments and refinements to the devices by the LMR program. The Fleets now use the devices as a regular component of the monitoring program. Additionally, analysis of the acoustic data provided as output from the autonomous devices is conducted using species classifiers developed under the same progression from the MMB program to the LMR program onto the Fleet.

When possible, the Fleet program managers also work closely with the ONR and LMR teams to coordinate field projects where the three programs have overlapping field projects—the combined M3R, tagging, visual/acoustic verification effort conducted in January 2012 at PMRF is one such effort.



Spinner dolphins seen near Kaula island.
Morgan Richie



A Minke whale observed on PMRF in 2012. Note the relatively short rostrum. The white patch on the top surface of the pectoral fin can be seen under the water adjacent to the body.
Mark Deakos, NMFS permit #14451

Continued from page 25.

- MMOs for visual survey embarked aboard the Navy surface ship being followed by the aerial survey.
- Acoustic recordings made during training events by the underwater instrumented range, using M3R assets.
- Satellite tags applied to marine mammals on or near the range before the commencement of the training events.

The results of combining the varied platforms and methodologies during the SCC are summarized below.

Aerial surveys were conducted during five SCC events between 2008 and 2012 using survey, focal follow and video. Eighteen focal follows conducted during those events produced a total of 4.5 hours of video recording. Seventeen of the 18 focal follows (94 percent) occurred during one SCC event in early 2011. Sixteen of the 18 (89 percent) sessions involved humpback whales (*Megaptera novaeangliae*); the remaining two were of spinner dolphins (*Stenella longirostris*) and false killer whales (*Pseudorca crassidens*). Received levels of sound were estimated for four of the 18 (22 percent) focal follows, for which MFAS transmission times and positions of marine mammals and ships were available.

Four of the focal follows involving seven humpback whales overlapped with MFAS transmissions, enabling received levels to be estimated. (Note: Estimated maximum received levels at focal group locations ranged from 135 to 161 decibels (dB) relative to 1 microPascal (μ Pa). Acoustic exposure is estimated as the sound pressure levels in decibels (dB) root mean square relative to 1 μ Pa.) Two sessions involved exposure to a single MFAS transmission, and two involved exposure to multiple sonar transmissions.

Among the sightings were three rarely seen priority species—Blainville's beaked whale, minke whale, and sperm whale.

It can be challenging to correlate acoustic and visual detections, because acoustic detections are obtained while the animal is underwater and visual observations are only possible when animals are surfacing. The acoustic and visual behaviors during this encounter are still being analyzed, but it may not be possible to determine whether the behaviors observed were in response to the ship, the MFAS transmissions, the presence of other whales nearby, or a combination of these factors.

Acoustic monitoring efforts at HRC evolved significantly from 2009 through 2012. In 2009, acoustic recordings at PMRF were performed two days per month. Each recording provides approximately one day of data from 31 hydrophones. Beaked whale clicks are often detected on hydrophones in the 1,000 m to 2,000 m depth range.

The 2010 analysis effort focused on beaked and minke whales before and after the February SCC, utilizing automated species passive acoustic detection and classification algorithms.

The Navy initiated a more intensive pre-SCC field monitoring effort in 2012. Surveys utilized both a 24-foot (7.3-m) RHIB and, for the first time, a dedicated U.S. Navy vessel—the 225-foot (67-m) ocean tug USNS Sioux. The survey was designed to optimize encounter rates for visual validation of acoustic detections and satellite tagging of species for which population size, habitat use, and movement pattern data are lacking. There were 161 sightings from USNS Sioux and 13 from the RHIB, representing eight confirmed species. Among the sightings were three rarely seen priority species—Blainville's beaked whale, minke whale, and sperm whale. Acoustic detections of six species were visually confirmed during the combined platform survey, including the first visual confirmation of a Blainville's beaked whale acoustic detection at PMRF.

BEYOND THE PACIFIC FLEET

Monitoring efforts in the HRC have been conducted in conjunction with training events, and are moving toward a focus on finer scale distributions, movements and behaviors of marine species at locations like the PMRF range. Much more information

remains to be collected at larger scales before characterization of the species in the environment can answer broader questions on occurrence and population level effects.


Navy monitoring in the HRC has demonstrated that when a system that can localize marine species in near-real time is combined with deployment of visual platforms to locations where marine species might be localized, sighting rates can be increased. The M3R system has been successful at directing vessel visual surveys to general locations of marine mammals that are continuously vocalizing or clicking. When paired with tagging vessels, the M3R operators have been able to cue tagging vessels to more than 30 percent of their sightings. "In January 2012, the marine resources team (from the Naval Facilities Engineering Command, Pacific) and I embarked upon a large vessel. Working in conjunction with the land-based M3R team and a contracted RHIB, we verified species that can be really challenging to observe, including Blainville's beaked whales," said Rivers. These sightings also provide visual verification of acoustic detections, thereby facilitating the development of better algorithms for acoustic classification and detection of marine species.



Sperm whale.

Another lesson from marine species monitoring in HRC is that more refined scientific questions emerge as patterns from observations are considered. These refinements are exceptionally useful to the Navy's monitoring program, because better questions will help propel the program toward filling key information gaps and developing new and more useful methodologies.

"The lessons learned from monitoring in HRC through 2012 have provided useful data and knowledge which will enhance Navy monitoring in particular and advance the science of marine mammals overall," Rivers said.

Within the HRC and beyond, the Navy will continue working closely with federal agencies, science institutions and other partners in the United States and abroad to develop new science to increase understanding and guide decision making in the marine environment. 

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Studying Military Expended Materials in the Marine Environment

NESDI & ESTCP Projects Assess Impact of Materials, Develop Biodegradable Substitute

TWO PROJECTS ARE studying the potential environmental impacts of Military Expended Materials (MEM) including copper guidance wire and sonobuoy decelerators (parachutes), and evaluating the use of biodegradable alternatives for those parachutes.

MEM are defined as munitions, items, devices, equipment, and materials which are uniquely military in nature and are used and expended in the conduct of the military training and testing missions. Examples include sonobuoys, flares, chaff, drones, targets, weights, and guidance wires. These items may result in a chemical or physical hazard to marine life. To promote environmental stewardship, a better understanding of the potential environmental impacts of these materials is needed.

Personnel from the Space and Naval Warfare Systems Command—Systems

Center Pacific (SSC Pacific) in San Diego, CA with funding provided by the Navy Environmental Sustainability Development to Integration (NESDI) program, have identified and provided an in-depth analysis of two MEM items. These two items, copper-based torpedo guidance wire and nylon sonobuoy parachutes, were chosen based on data gaps identified by experts from the Navy's range community. The Department of Defense's (DoD) Environmental Security Technology Certification Program (ESTCP) has

funded a multi-agency project to evaluate the use of biodegradable sonobuoy parachutes as a replacement to the traditional nylon parachutes.

Copper-based Torpedo Guidance Wire

The conceptual approach used in this NESDI study was to identify potential environmental impact pathways from torpedo guidance wire to the marine environment and to



Copper torpedo guidance wire with plastic coating intact after 45 days.

INSET: After 45 days, only the tips of the copper wire experienced any corrosion.

evaluate each pathway through empirically derived data and/or peer-reviewed literature. The study approach focused on site-specific environmental characteristics and marine species relevant to the training areas where copper guidance wire is used.

The potential risks (or stressors) identified for torpedo guidance wire were both chemical (leached copper) and physical (entanglement hazard). A series of experiments and analyses were carried out to evaluate the various stressors. These included experiments to quantify copper leach

rate over time and under various degrees of plastic coating degradation, mechanisms of coating degradation, toxicity testing, guidance wire sinking rate, and breaking strength. Additionally, a simple copper dispersion model was developed to predict water column and sediment concentrations. A list of known marine mammals and sea turtles identified in the Navy testing range areas was assembled and analyzed with respect to diving and foraging behavior to assess the potential for entanglement.

The evaluation of copper leached into the marine environment as a poten-

tial stressor suggests that there is no negative impact to the water column, sediments, and organisms living within these environments. Predicted water column and sediment copper concentrations are below the water quality criteria, sediment guidelines, and predicted toxicity endpoints.

Evaluation of the guidance wire as a potential physical stressor suggests that there is an extremely low entanglement potential for animals found within the range areas. The physical characteristics of the wire (breaking strength and reluctance to looping or coiling) and sea floor habitat types,

The Basics About ESTCP

ESTCP IS DoD'S environmental technology demonstration and validation program. The program was established in 1995 to promote the transfer of innovative technologies that have successfully established proof of concept to field or production use. ESTCP demonstrations collect cost and performance data to overcome the barriers to employ an innovative technology because of concerns regarding technical or programmatic risk.

The program's goal is to identify and demonstrate the most promising innovative and cost-effective technologies and methods that address DoD's high-priority environmental requirements. Projects conduct formal demonstrations at DoD facilities and sites in operational settings to document and validate improved performance and cost savings. To ensure the demonstrated technologies have a real impact, ESTCP collaborates with end users and regulators throughout the development and execu-

tion of each demonstration. Transition challenges are overcome with rigorous and well-documented demonstrations that provide the information needed by all stakeholders for acceptance of the technology.

ESTCP issues an annual solicitation for proposals from the Federal government, academia, and industry and employs a competitive selection process to ensure that ESTCP funds high-quality demonstrations. ESTCP requires each project to develop a formal test and evaluation plan. Demonstration results are subject to rigorous technical reviews to ensure that the conclusions are accurate and well supported by data.

ESTCP is managed by a Director and Deputy Director, five Program Managers, and a Financial Officer. The ESTCP office is co-located with the Strategic Environmental Research and Development Program (SERDP) in Alexandria, VA. In this joint program structure, the management staff has insight into the entire range of scientific and technical issues associated with an environmental problem,

from basic research questions through implementation. ESTCP relies on the technical skills offered by the participating Services serving on its technical committees to assist in the technical aspects of program development, project selection, program monitoring, and technology transfer.

ESTCP projects are managed within the following five program areas:

1. Energy and Water
2. Environmental Restoration
3. Munitions Response
4. Resource Conservation and Climate Change
5. Weapons Systems and Platforms

For more information, visit the program's web site at www.serdp-estcp.org.





The first identified MEM, copper wire, is sometimes used to guide torpedoes such as this one.

MC1 Ricardo Danan

coupled with minimal exposure potential to marine mammals (based on diving and foraging behaviors) minimizes any potential entanglement threat. These data suggest that torpedo guidance wire does not present a significant chemical or physical hazard to the marine environment.

A technical report evaluating the guidance wire titled, “Copper Based Torpedo Guidance Wire: Applications and Environmental Considerations,” has been finalized and can be obtained by contacting Brandon Swope, Principal Investigator for this NESDI study.

Nylon Sonobuoy Parachutes

Sonobuoys are acoustic transmitters deployed from aircraft during anti-submarine training. To ensure that the sonobuoy is not damaged during water entry, a nylon parachute is attached and deployed. The parachute separates from the sonobuoy following contact with the water and sinks through the water column, ultimately settling on the sea floor. To identify and evaluate potential environmental impact pathways from nylon sonobuoy parachutes, the project team used a conceptual model approach similar to that used with the copper guidance wire. Researchers focused on site-specific environmental characteristics and marine species relevant to the training areas where sonobuoy testing occurs. Potential hazards identified were entanglement, ingestion, and smothering.

The results of the evaluation suggest that sonobuoy parachutes do not present a significant physical hazard to the marine environment. The potential for entanglement, ingestion, or smothering to occur are low based on the following reasons:

■ Short duration the parachute is on the surface or sinking through the water column

■ Deep water depths where the parachutes come to rest

■ Low numbers of parachutes deployed relative to the size of range area

A technical report titled, “Nylon Sonobuoy Parachutes: Applications and Environmental Considerations” is in final review and will be available shortly by contacting Brandon Swope.

Biodegradable Sonobuoy Parachutes

Although the traditional nylon sonobuoy parachutes present minimal risk to marine life, an investigation into alternative materials has been initiated to help with overall environmental stewardship and pollution prevention measures.

A multi-agency team was funded by ESTCP to optimize a dissolving and biodegradable material for use in Navy sonobuoy parachutes. Project partners include personnel from the following organizations:

■ Naval Air Warfare Center Weapons Division, China Lake, California

- Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland
- Natick Soldier Research and Development Engineering Center, Natick, Massachusetts
- Space and Naval Warfare Systems Command—Systems Center Pacific
- Naval Facilities Atlantic
- Navy Region Northwest
- Naval Undersea Warfare Division, Newport, Rhode Island

First, the team developed a clear and effective testing protocol for candidate materials. Materials were identified and tested for dissolution, biodegradability, strength, and toxicity. In order for a biodegradable material to replace the traditional nylon parachute material, it must meet all current requirements and specifications. These metrics include strength, load bearing capacity, durability, shelf life requirements, and the ability to fit into the current sonobuoy housing. The material also needs to withstand a variety of weather conditions—maintaining strength during a rainstorm, yet dissolving rapidly in the marine setting to achieve the environmental goals (30 minutes in the warm water off Florida coast and 12 hours in the colder water off the northwest U.S. coast).

Two candidate materials were chosen for testing and evaluation, a polyvinyl alcohol (PVOH) film and a blend of PVOH and polyhydroxyalkanoate (PHA) materials. Several films from domestic suppliers were evaluated for tensile strength and disintegration time in both fresh and saltwater at various temperatures. Higher grades of the material had increased strength, but would neither disintegrate nor dissolve in seawater rapidly enough to meet the study goals. Ultimately, a warm-water soluble grade PVOH film (A200, Monosol Inc.) with a thickness of 50 microns (0.002 inches) was selected for prototype development. Disintegration times ranged from 50 seconds to eight minutes for freshwater, and 20 minutes to three hours for saltwater in temperatures ranging from 20 degrees to 5 degrees Celsius (68 to 41 degrees Fahrenheit).

During initial testing, it was determined that in order to meet the engineering requirements related to strength and



Parachute prototype using 4-mil laminated PVOH.
Andrew Strzepek

The Basics About the NESDI Program

THE NESDI PROGRAM seeks to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials, and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.

The NESDI program is the Navy's environmental shoreside (6.4) Research, Development, Test and Evaluation program. The program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by the Naval Facilities Engineering Command out of the Naval Facilities Engineering and Expeditionary Warfare Center in Port Hueneme, California. The program is the Navy's complement to the Department of Defense's ESTCP which conducts demonstration and validation of technologies important to the tri-Services, U.S. Environmental Protection Agency and Department of Energy.

For more information, visit the NESDI program web site at www.nesdi.navy.mil or contact Leslie Karr, the NESDI Program Manager at 805-982-1618, DSN: 551-1618 or leslie.karr@navy.mil.





Polyvinyl alcohol (PVOH) being dissolved for use in toxicity testing.
Brandon Swope



Newly designed woven PVA decelerator prototype.
Andrew Strzepek

load bearing capacity, layers of the PVOH film would need to be laminated together to achieve a greater thickness. Commercial lamination trials were successful, and rolls of 2-layer, 3-layer, and 4-layer films were developed. Various laboratory tests were then conducted on the un-laminated and laminated films. Tensile testing was carried out to determine the mechanical strength of the materials. Water exposure tests were also conducted to evaluate tensile strength during simulated rainfall. Lastly, toxicity bioassays were performed on the various films using mussel larvae, sea urchin larvae, mysid shrimp, and topsmelt.

The results of the intensive testing identified several performance gaps, ultimately concluding that the laminated PVOH film was not suitable for further field demonstration. These performance gaps include:

- Adverse affect of rain on the parachute. Half of the parachutes strength was lost during rain testing, which will likely cause the parachute to fail upon ocean entry.
- Increased stiffness of the thicker film. Increased stiffness, especially at cold temperatures, created packing issues when loading into a sonobuoy. Increased stiffness could also cause excessive opening times or failure to open.
- Lack of film permeability. Because the material blocks airflow, the initial shock following deployment results in a high degree of mechanical stress and may lead to parachute failure.
- Toxicity related to lamination process. The unlaminated PVOH showed no toxicity to all four species being tested. However, two of the more sensitive species (mussel larvae and sea urchin larvae) showed toxicity at low concentrations of the laminated material. It was



Weaving process for the new PVA parachute prototype.
Andrew Strzepek




Sonobuoys are dropped from aircraft where they parachute to the surface of the water.

MC1 Kirk Worley

determined that residual ethyl acetate from the adhesive used in lamination process was most likely the causative agent.

The testing results concluded that the initial parachute design required further development to improve strength and pliability. This led to a revised study approach utilizing the other candidate material, PHA, and a new manufacturing process. The new manufacturing tactic utilized a

woven design which increased permeability and overall mechanical strength. Two smaller scale parachutes were successfully manufactured out of PHA utilizing the weaving technique. These parachutes were then evaluated during a drop test from a hovering Blackhawk helicopter. The drop height was 1,100 feet with a load of 12 pounds. The velocity at opening was determined to be 154 miles per hour (225 feet per second). The prototype canopy did not show any signs of damage and the test load did not sustain any major damage upon impact. The new woven parachute design has potential to meet all of the requirements needed for a successful nylon replacement.

After assessing the results of these efforts, ESTCP has decided to halt funding on this effort until more basic research is carried out to ensure the newly developed material is appropriate for full scale demonstration and validation. Alternate funding sources to complete the research and development are being pursued. 

For More Information

FOR MORE INFORMATION on this project, visit www.serdp.org, enter "WP-201222" in the search box, and select the link for "Biodegradable Sonobuoy Decelerators."



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Retired Admiral and Renewable Energy Advocate Shares His Perspectives on Current Energy, Installations, Environmental & Safety Challenges

I**N THE SPOTLIGHT** for this issue of *Currents* is the Honorable Dennis McGinn, who was recently named Assistant Secretary of the Navy for Energy, Installations & Environment (ASN (EI&E)). On October 21, 2013, Kenneth Hess, director of communication and outreach for the Chief of Naval Operations Energy and Environmental Readiness Division (CNO N45) and Bruce McCaffrey, managing editor of *Currents* magazine, sat down with Mr. McGinn in his Pentagon office to get his perspectives on the current energy, environmental, installation and safety challenges facing the Navy and Marine Corps team.

CURRENTS: Please describe your primary responsibilities in your new position.

MCGINN: I feel really fortunate to come to the position of Assistant Secretary of the Navy with the benefit of more than 35 years in uniform. That gives me a tremendously valuable context in which to carry out the policies, planning and procedures necessary to assist Secretary Mabus manage the energy, installation,

I don't want this country to ever lose the environmental quality that we have achieved. We're far from perfect, but we lead in so many ways—in the quality of air, water, and soil.

environmental and safety portfolio for the department. In this job, it's all about reaching the energy goals that the Secretary established in 2009. It's about caring for the Navy's infrastructure, building, piers, runways, and utility systems that allow us to operate globally, and doing that in an environmentally responsible and safe manner. At the same time, we are working to clean up areas of past environmental ills that occurred decades ago. We want to prevent future clean-ups by being really good stewards of the environment.



ASN (EI&E) Dennis McGinn

SECNAV Energy Goals

AS THE DEPARTMENT of the Navy works to reduce energy consumption and lead the Nation toward energy independence, the Secretary of the Navy (SECNAV) has outlined five energy goals. These goals seek to enhance and better enable our combat capabilities, to provide greater energy security. Outlined below are examples of how the Navy is moving forward to achieving each of the goals.

1. Increase Alternative Energy Use Department of the Navy (DON)-wide

By 2020, 50 percent of total DON energy consumption will come from alternative sources.

- Continue aggressive pursuit of both large and small scale renewable energy projects on or near DON installations.
- Partner with industry, commercial aviation, and other government agencies to develop a demand signal to alternative fuel industry and encourage growth of a domestically produced, cost competitive biofuel industry.

- Decrease energy consumption, both ashore and afloat, through installation of energy efficient technologies and development of policies that encourage energy awareness and conservation.

2. Increase Alternative Energy Ashore

By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources.

- Continue installation of energy efficient upgrades to buildings and facilities.
- Encourage military members and families to conserve energy through incentives and other programs to empower them to save and be aware of their own energy consumption.
- Produce or consume one Gigawatt of new, renewable energy to power naval installations across the country using existing authorities such as Power Purchase Agreements, enhanced use leases, and joint ventures.

3. Sail the "Great Green Fleet"

By 2012, DON will demonstrate a Green Strike Group in local operations and sail it by 2016.

- In 2012, DON successfully demonstrated a Green Strike Group at the Rim of the Pacific (RIMPAC) exercise off the coast of Hawaii.
- The DON remains focused and on track to sail the Great Green Fleet by 2016—ushering in the "new normal" where biofuels will be a constant and regular part of our operational platforms.



F/A-18 Hornets participated in the Great Green Fleet demonstrations as part of RIMPAC 2013—demonstrating the successful use of biofuels in fixed wing aircraft.

Liz Goettee

4. Reduce Non-Tactical Petroleum Use

By 2015, DON will reduce petroleum use in the commercial vehicle fleet by 50 percent.

- Increase purchase and use of flex fuel vehicles, hybrid electric vehicles, and neighborhood electric vehicles.
- Expand alternative fuel infrastructure to support these vehicles.

5. Energy Efficient Acquisition

Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.

- Create a standardized process for determination of life-cycle energy costs, fully-burdened cost of energy and other energy related characteristics of potential platforms, weapons systems, and buildings.
- Encourage contractors to minimize energy footprint and factor energy into the acquisition decision making process.

CURRENTS: In your own words, what is the mission of ASN (EI&E)?

MCGINN: To have a Navy and Marine Corps team that is as energy-efficient as possible. This means getting as much combat effectiveness and operational efficiency out of every unit of energy as possible—whether it's a kilowatt hour, a megawatt hour, or a gallon of liquid fuel—to squeeze out as much capability as we can for combat, operations, and training. We also seek to provide the highest quality of life that we can for our Sailors and Marines and their families by using energy as effi-



Then-CNO Admiral Gary Roughead (left) speaks to Vice Admiral (retired) Dennis McGinn and senior naval leadership at the 2009 Naval Energy Forum.

We don't accept "business as usual" for the sources of our electricity and the fuels we use.

ciently as possible. We don't accept "business as usual" for the sources of our electricity and the fuels we use.

We want to diversify our energy portfolio. We want to bring in more renewable energy for the production of our electricity. In particular, we want to diversify our liquid fuel portfolio by incorporating biofuels. Strategically, this is going to make us a much stronger and more effective naval force and will also contribute to our nation's energy security by delivering alternatives to a continuing dependence on oil that is a strategic and economic vulnerability.

CURRENTS: What do you think your top challenges will be, and how do you plan to meet those challenges?

MCGINN: A major challenge that comes to mind is the budget—a big change since I was in uniform. We always wondered if we would have enough of a "top line" on our budget to meet our priorities. And that's certainly the case now, especially with our "top line" coming down. But the added challenge today—on the Navy Secretary's staff, on the Commandant's staff, and on the CNO's staff—is the

uncertainty about what that "top line" is going to be. Sequestration, operating on a continuing resolution, the government shutdown, and furloughs have all contributed to this uncertainty. It's really hard for the Navy and Marine Corps team—the greatest naval force in the history of mankind—to maintain its edge when there's that much uncertainty in the budget.

We have to make decisions between today's combat readiness—which must always take priority—and making trade-offs on the investments that we want to make to improve our capabilities and future capacity.

CURRENTS: We do see hesitation that results from that uncertainty. When people are not sure of what they are allowed to do in an uncertain budget environment, the default may very well be, "Well, we won't do anything until we know for sure." Do you think this uncertainty is causing risks to the Navy and its mission?

MCGINN: Well, it certainly is posing risks to the maintenance of our infrastructure, utilities, and inventory. You

must give priority to combat readiness. And when there isn't enough money to operate the Navy and Marine Corps force structure that we have today, you have to set some priorities. And the place to take risk is not with our combat readiness and safety. We might be able to defer maintenance, but that can be a challenge down the road. Everything works until it doesn't work anymore. And when it doesn't work anymore, it can cause the lights to go out, water pipes to break, and other failures to occur. When you have to make tough decisions regarding maintenance, you are increasing the risk to the organization's capabilities. In a declining budget environment, you just have to take some risks. It's managed risk—risks that we manage prudently. We have a great team of professionals, both military and civilian, who make sure those risks are made known and managed as carefully as possible.

CURRENTS: How have your past experiences prepared you for your current assignment?

MCGINN: My personal story on energy begins when I returned from two combat deployments in 1973. I found myself sitting in gas lines. In the wake of the 1973 Yom

Kippur war, the Organization of the Petroleum Exporting Countries imposed an oil embargo on the United States. It was the first time that gasoline rationing had been put in place since World War II. I thought to myself, "Wow. Energy and national security. There's a link there." I never forgot that throughout my Navy career. So I always had it in the back of my mind that we've got to be mindful of energy consumption and energy prices.

As budgets went up and down over the years, we would get really tight on ship steaming days. We looked for opportunities to get the maximum amount of training effectiveness out of every gallon of JP5 (jet fuel) or DFM (diesel fuel marine) that we could. Our focus has been not so much on alternative energy as it has been on energy efficiency. When I was a Corsair (A-7) squadron commander, we got permission to remove two of our six weapons pylons to reduce drag. We had the ability to put them on quickly if needed—but we saved a tremendous amount of fuel and got a lot more combat readiness training by getting rid of one-third of our external weapons stations. And the airplane performed better, too.

The USS Princeton Study

FOR MORE INSIGHTS into Rocky Mountain Institute's survey of energy efficiency potential aboard the USS Princeton (CG-59), visit www.nps.edu/Academics/Institutes/Meyer/docs/Sl4000/Amory_Lovins/S01_09_EnergyEffSurveyCG59.pdf.

The guided-missile cruiser USS Princeton (CG 59).
MC2 Class Devin Wray



When I commanded an oiler (the USS Wichita), I was in charge of seven million gallons of liquid fuel. As a result, I got a real appreciation for how much fuel we actually use. When I was in senior positions in the Navy, I'd bring in experts like Amory Lovins from Rocky Mountain Institute to speak with our Secretaries, CNOs, and others about energy. When I was the Third Fleet commander, Dr. Lovins led a team of experts to address energy efficiency issues in the Navy using the USS Princeton (CG 69) as the subject for a study. They assessed our operations while in-port and underway and made recommendations in areas where energy efficiency could be improved. The recommendations, in what became known as the "Princeton Study," fall into the following three broad categories:

1. **Operating procedures**

These recommendations focus on procedures on Navy ships—procedures that could be modified without changing any of the technology—educating and address cultural issues that resulted in ships operating more efficiently.

2. **Overhaul**

There are things that can be done to Navy ships while they are in overhaul that result in energy savings—things like installing stern flaps or engineering auxiliary systems that are more energy efficient.

3. **Design**

When designing a ship, total lifecycle costs and total energy costs should be built into the lifecycle. Combat effectiveness, weapons load, the man/machine interface are also key. All these things can be achieved with increased energy efficiency.

CURRENTS: What in your career drove home for you the importance of protecting the environment?

MCGINN: I can remember going on many deployments and looking forward to those very important visits to ports around the world. And I remember being absolutely appalled at some of the conditions that I encountered in terms of debris in the harbor, on the beaches, and even in national parks in some cases.

You get to see how some other parts of the world live in terms of a greatly degraded environmental quality. You go to a large international city and are not able to see the sights because of the smog or realize that the water is not very drinkable. You come back to the United States and say "This is my country and this is why I defend it."

I don't want this country to ever lose the environmental quality that we have achieved. We're far from perfect, but we lead in so many ways—in the quality of air, water, soil, and our care for all natural and cultural resources. I think that folks in the Navy and Marine Corps who get to see different parts of the world come to appreciate that we are, in fact, good stewards of the environment as we train or operate around the globe.

The Basics About Dennis McGinn

MR. DENNIS MCGINN was sworn in as ASN (El&E) on September 3, 2013. In this position, Mr. McGinn develops Department-wide policies, procedures, advocacy and strategic plans. He also oversees all Department of the Navy functions and programs related to installations, safety, energy, and environment. This includes effective management of Navy and Marine Corps real property, housing, and other facilities; natural and cultural resource protection, planning, and compliance; safety and occupational health for military and civilian personnel; and timely completion of closures and realignments of installations under base closure laws.

Mr. McGinn is the former President of the American Council On Renewable Energy (ACORE). While at ACORE, he led efforts to communicate the significant economic, security and environmental benefits of renewable energy. Mr. McGinn is also a past co-chairman of the CNA Military Advisory Board and an international security senior fellow at Rocky Mountain Institute.

In 2002, after 35 years of service, Mr. McGinn retired from the Navy after achieving the rank of Vice Admiral. While in the Navy, he served as a naval aviator, test pilot, squadron commanding officer, aircraft carrier commanding officer (of the USS Ranger (CV 61)), and national security strategist. His capstone assignment was as the Deputy Chief of Naval Operations for Warfare Requirements and Programs, where he oversaw the development of future Navy capabilities. In a previous operational leadership role, he commanded the U.S. Third Fleet.

Mr. McGinn is a past member of the Steering Committee of the Energy Future Coalition, the United States Energy Security Council, and the Bipartisan Policy Center Energy Board. He earned a B.S. degree in Naval Engineering from the U.S. Naval Academy; attended the national security program at the Kennedy School of Government, Harvard University; and was a Chief of Naval Operations strategic studies fellow at the U.S. Naval War College.



Secretary of the Navy Ray Mabus swears in Dennis McGinn as the new ASN (EI&E). The Office of the Assistant Secretary of the Navy for Energy, Installations and Environment serves the Department of the Navy and the nation by enhancing combat capabilities for the warfighter and greater energy security.

MC1 Class Arif Patani

CURRENTS: What perspectives did you gain during your tenure at the American Council On Renewal Energy (ACORE)?

MCGINN: As a result of my interest in energy, back around the time I retired, I was invited to serve on ACORE's board of advisors. Over the years, I participated in many of their events and, about three years ago, I was asked to be their president and Chief Executive Officer.

Working at ACORE really appealed to me because I realized that it isn't just one technology that's going to lead our transformation into a clean energy economy. It's a little bit of this and a little bit of that depending on where your renewable energy resources are and where the needs are greatest.

CURRENTS: Your biography on the ACORE web site mentions the online "Energy Fact Check" resource the organization created under your tenure. Could you speak to the need for sharing that type of information?

MCGINN: We were really proud of that initiative which was rolled out in June 2012. There was so much misinformation about renewable energy out there that we wanted to say, "Okay, what are the facts?"

What are the forms of renewable energy? What do they really cost to implement and use? Can you scale them up?

How do they work in conjunction with traditionally produced electricity? What are the facts about biofuels compared to petroleum?

We always cited original sources, using as objective a source as possible—basically put the facts out there. So you address a myth like "Renewable energy is strictly a government program. It will never scale up. It's too expensive." Then you start to cite real, large-scale projects in wind, solar, biomass, or biofuels and provide real numbers, real dollar investments, and real dollars returned. It is these facts that are an asset for journalists and people making policy decisions in State legislatures and up on Capitol Hill.

The best kind of policy is informed policy. Start with the facts. Do the objective cost benefit/risk analysis to get to the best policy or the best investments going forward. Those policies and investments will be much clearer and more effective if you start with the facts—instead of trading bumper sticker slogans back and forth across opposite ends of the political spectrum.

CURRENTS: Is there a way of leveraging that kind of thing on the Navy side?

MCGINN: Well, the good news is that in the Navy and Marine Corps we deal with facts. If you don't deal with facts in combat, you don't live very long.

We are a talented engineering, data-driven service, whether it's related to financial management or putting rounds down-range. We can use our fact-based culture to advance our energy and environmental programs. The point is, when you do the cost benefit/risk analysis, it shows that a "business as usual" approach to our energy portfolio isn't a viable option. We want to lead and have a better outcome. We don't want to be succeeded by folks who look back in five or ten years and question the investments we made or didn't make in our energy, installation, environmental, and safety programs. We want to leave a better and stronger Navy and Marine Corps team than the one we found. And that's what the Secretary is all about. That's what the Service Chiefs are all about. And that's the message that we're getting across down to the deckplate level.

CURRENTS: There's a lot of interest and effort from senior leadership, including yourself, to adjust our energy culture—adopt a more resilient approach to saving energy through cultural change. Can you speak to that?

MCGINN: Sure. We are conducting classes at the highest levels including flag officers and personnel from the Senior Executive Service. Be it at the Naval Academy or through our recruit training, we need to get the word out so that everyone is aware of our energy goals and related initiatives.

Energy isn't free. Energy can either be an asset or a liability in terms of operations and quality of life. Energy awareness through education is so important in helping us to change from a culture of "Energy is always going to be available. The lights are always going to come on. There's always going to be enough fuel." to "We are going to be a more



Mr. McGinn commanded an oiler (the USS Wichita) during his years in the Navy.

PH3 Brewer

CURRENTS: What are your top priorities (in the EI&E's portfolio)?

MCGINN: Our first priority is to help meet Secretary Mabus' energy goals. Secondly, we need to produce the most efficient, combat-ready installations possible. And thirdly, we need to carry out the Navy and Marine Corps mission in as responsible and safe a manner as possible—minimizing our impact on the environment.

effective combat force if we squeeze more combat effectiveness and operational efficiency out of every unit of energy." That awareness is necessary to change our culture.

If we measure combat effectiveness in an aviation unit by the number of hours flown, that's not a good metric. It's more important to ask ourselves, "What are we doing with every hour of flight operations training?" If you have spent some time in a realistic combat simulator, once you go

airborne you are much more adept at being able to manage those weapons systems, to fly that plane and to really “get it.” I’m not saying there’s a one-for-one substitution. I’m just saying that the things that we do on the ground can enhance the combat return on investment that we get from every gallon of fuel that we use. That’s true in the air or at sea. The same goes for the use of tactical vehicles. If I use a small sedan instead of a Hummer to go from one part of an installation to another, I still get there but I get there with a lot less fuel.

If I’m going out into the field and I need the Hummer, I want to have the Hummer available and the right fuel to use it. The idea is to use the right kind of energy with the right kind of vehicle at the right time. We want to have that energy available—in all of its forms—when and where we need it.

CURRENTS: As you know, many of our shore installations are using electric golf carts for flight line maintenance and other operations.

MCGINN: Yes. We’re going to be taking a good look at how we procure and manage our non-tactical vehicles. We’ve been working with the General Services Administration for a number of years to figure out how we can modify our non-combat tactical fleet so that it is more energy efficient—for every class of vehicle from school buses to the golf carts you mentioned.

We’ll find that there are going to be more and more commercial off-the-shelf choices available. In the civilian automotive industry, internal combustion vehicles are getting more energy-efficient. We’re also getting more choices of plug-in electric hybrids and affordable electric vehicles. The ultimate solution will be a mix of all of these things.

In civilian shipping fleets, we are starting to see a move away from diesel fuel to compressed natural gas. It doesn’t make sense across the board, but it does make sense for certain applications—like trucking. You can pay 25 percent

less for compressed natural gas than for diesel—and the environmental footprint is so much better. So it’s a great time for our own teams to look at other options for our non-tactical vehicle fleets.

This has to be an iterative process. You can’t suddenly change from one energy source to another overnight. You have to think about what natural gas or hydrogen distribution looks like in the years to come. If you want to use more biofuels, you’ve got to have a distribution system to make those fuels available. What you should not do—what we will not do—is just stand still. You can’t say, “We can’t get these types of vehicles because of our infrastructure, and we can’t build the infrastructure because there aren’t enough vehicles available.”



Mr. McGinn was the commanding officer of a Corsair (A-7) squadron during his years in a Navy uniform.

LCDR John R. Leenhouts, USN

We’ve got to break through that and say, “We are going to make these changes where it makes sense from a cost benefit/risk analysis point of view.” That goes to organizational culture.

CURRENTS: In your mind, what are the most significant economic, security and environmental benefits of renewable energy?

MCGINN: There’s clearly a direct link between our energy choices and our energy usage and the environment. We can improve local, regional, and global environmental quality by making wise energy choices and using all forms of energy as efficiently as we can.

Renewable energy is good for energy security because energy security means having as much energy as you need to do the job when and where you need it. By having a more diverse portfolio of energy, you're going to be more secure, especially as we go forward and have larger portions of our total energy pie coming from different sources. From an economic standpoint, thinking about declining budgets, renewable energy is, at a minimum, a hedge against price vulnerability on the global oil market.

Going forward five or 10 years, we are going to be able to produce biofuels and electricity from alternative sources at par or below the cost that we would be paying if we went along with "business as usual."

Globally and locally, you get better environmental outcomes and environmental security by increasingly using clean sources of fuel and energy. The Secretary is devoted to pursuing this in the most cost-effective way possible. We're going to be making very good business-based choices about our forms of energy going forward as we diversify our portfolio. The only reason we are changing the mix of energy that we use is to maximize our combat readiness and operational efficiency.

to operate more of their own ships and helicopters on biofuels. We're using lessons learned from that event to plan for sailing the Great Green Fleet in 2016. We have a lot of work to do to achieve that goal, but it is a high priority and I believe we can achieve it.

I think that many nations are starting to realize that "business as usual" isn't a viable option, especially in navies and Marine Corps. We need to plan for a future that's five or 10 years out—and that doesn't just happen. You have to make it happen by making some wise investments. One of our biggest successes toward the implementation of Secretary Mabus' energy goals has been the awareness those goals have created, not just within our Navy and Marine Corps team but with the navies and marines that we work with in international operations like RIMPAC.

CURRENTS: Can you share some examples from your career (in the Navy and elsewhere) where energy created challenges for your mission? What did you do to address those challenges?

MCGINN: Energy can be a liability if you don't have the right kind of energy to get the job done whenever and wherever you need it. If you have an inefficient force, you

The only reason we are changing the mix of energy that we use is to maximize our combat readiness and operational efficiency.

CURRENTS: What are your thoughts about the deployment of the Great Green Fleet?

MCGINN: The demonstration during the 2012 Rim of the Pacific (RIMPAC) exercise was a success. It was a tremendous end-to-end test operating everything we had—combat vehicles, ships, airplanes and helicopters—on a 50-50 mix of biofuel and petroleum. From delivery points to our combat logistics force to our Military Sealift Command ships, across the hose lines into the tanks of ships and aircraft—it really worked. It was a test across the entire system for what we call drop-in fuel—fuel that meets all the specifications of our traditional forms of liquid fuel without requiring any modifications to any equipment. That was so impressive to the other navies that we've already signed an agreement with the Australian Navy and other RIMPAC participants who want

have to refuel more often whether you're on the ground or in the air. When you're refueling, that's time off-station. Anything you can do—with better technology or enhanced operating procedures—that reduces the amount of time you spend refueling, that's a good thing. And it directly translates into combat effectiveness.

CURRENTS: As you know, the Navy is currently working to renew its permits and authorizations for training and testing activities in several areas. As the Atlantic Fleet Training and Testing and the Hawaii-Southern California areas cover about 80 percent of the Navy's training and testing worldwide, these permits are vital for Navy readiness. Any comments about those or other projects?

MCGINN: On the one hand, this is so complex, it can make your head hurt. There are many things to factor into these environmental impact statements and many reviews

to conduct inside the Navy and the Department of Defense and then with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and other agencies. On the other hand, this is the hard work that needs to get done to make us good stewards of the environment. We want to be compliant with the National Environmental Policy Act, the Marine Mammal Protection Act, and every other federal, state, and regional statute that we have to comply with. So in our pursuit of combat effectiveness, we

want to be able to contribute to the body of knowledge that allows us to maintain a healthy balance between our operations and the preservation of the environment.

CURRENTS: Could you speak briefly about the way forward for acquisition, from both an energy and an environmental standpoint?

MCGINN: We're working with the acquisition community, Assistant Secretary Stackley and his team, and the

In our pursuit of combat effectiveness, we want to minimize the impact that our activities have on our environment.



Mr. Dennis McGinn (far left) participated in a panel discussion at the White House Champions of Change Veterans Advancing Clean Energy and Climate Security Event in November 2013.

Matty Greene

want to minimize the impact that our activities have on our environment—our water, land and air and the natural resources they support and maintain. In the Atlantic and Southern California/Hawaii operating areas, we are being very deliberate and studious in our approach to make sure we are protecting the environment without sacrificing the effectiveness of our combat training.

We're good partners with a number of environmental groups. We don't want to be perpetually involved in lawsuits brought against the Navy for any real or perceived environmental violation. We'd really rather partner with these groups. We also want to reach out wherever we can and share the environmental information that we gather in the course of our ongoing training and operations with other parts of the government including the National Marine Fisheries Service and the Bureau of Land Management. We

Systems Commands, to review the energy and environmental impact of certain programs going forward. It takes a long time to design, build and operate a weapons system, particularly major systems like the Joint Strike Fighter and the Littoral Combat Ship. We need to slowly and surely consider energy consumption as a key performance parameter throughout the acquisition lifecycle.

CURRENTS: What are your views on preparing for the impacts of climate change?

MCGINN: We're working with Rear Admiral White, Rear Admiral Slates, and others to elevate the visibility and effectiveness of Task Force Climate Change and what we can do to adapt our infrastructure and operations to the potential impacts of climate change. It's more than just rising sea levels. Right now, we're looking at the impacts of tidal surges and need to develop a set of principles for adapting our infrastructure accordingly.

For example, if we believe that we are going to have more frequent and severe storms going forward, it might be a good idea to position our computers and backup power generators in places that are appropriately elevated and sheltered so that when you most need that backup power it's going to be available and it won't be knocked out during a storm surge. It isn't just about building higher piers and seawalls. It's about practical positioning. It's working with the civilian communities in which we live and operate and taking some very practical steps. I've had some discussions with senior officials in the Office of the Secretary of Defense who share this view.

In dealing with climate change and more frequent severe weather events, it comes down to resiliency. Our Navy and



The aircraft carrier USS Ranger (CV 61).

PH2 Henry

Marine Corps are resilient. You need resilience in how we plan our installations and how we plan our forces. As severe weather poses greater challenges for us, we need a culture and technologies that are sufficiently resilient.

CURRENTS: What else would you like *Currents* readers to know?

MCGINN: I would simply like to say that a healthy organization like the Navy and Marine Corps team constantly questions itself in terms of what are we doing, how we are doing it, and whether there is a better way to do it. In other words, being dynamic and not so wedded to the status quo that there's an unwillingness to change. Just because we've always done things one way doesn't mean that it's the only way. Our Navy and Marine Corps has a rich history of innovation and adaptation and that's the way you stay ahead in life.

Life is constantly changing and you need to adapt with it. You need to lead that adaptation with innovation whenever you can. We've changed the ways we power our Fleets and the kinds of Fleets that we have out there to bring even more combat readiness and operational efficiency to our mission. That's what we're doing now in terms of environmental stewardship and the development of our energy portfolio. We are relying on 238 years of Navy history to do so.

We welcome new ideas. We never assume that things are going as perfectly as planned. There are real world challenges out there but there are also real world solutions. So we are always interested in having a dialogue about how we can do things better in terms of energy, the environment, and safety. Safety is a key part of my portfolio both ashore and operationally, making sure that our safety policies allow us to do our training, operate our installations, and go to sea.

We welcome suggestions from the Fleet. This isn't a Navy that operates in Washington. This is a Navy and Marine Corps that operates globally. When you're out there in the real world as I have been when I was in uniform, you get a much finer appreciation for some of the challenges that are out there—whether they're budget-driven or enemy-driven—and what some of the solutions to those challenges might be.

We want to encourage innovation and the free flow of information, whether it's a discussion at the squad level, in a marine platoon, in a squadron ready room, or a ward-room on a ship. We want those discussions to lead to a better understanding of what we are trying to accomplish.

CURRENTS: Thanks for speaking with us today, sir.

MCGINN: Happy to do it. ⚓

DID YOU KNOW?

Did you know that each and every one of us can help to secure the Navy's energy future?

- Did you know that Secretary of the Navy (SECNAV) announced that by 2020, half of Navy's total energy consumption afloat would come from alternative sources?
- Did you know that ships, aircraft, and tactical vehicles use 84 percent of the energy consumed by the Navy?
- Did you know that the Department of Navy consumes 28 percent of the Department of Defense's operational and shore energy?

From the research student and new recruit, to the activity duty Sailor, government civilian, and contractor, we all can play an important role in sustaining energy security for our Navy.

Your Navy is launching an interactive and dynamic media campaign that will spotlight some the Navy's most successful energy savings practices while profiling innovative individuals who have successfully contributed to strengthening the Navy's energy security. Get the chance to hear firsthand how your fellow shipmates are personally reducing fossil fuel and implementing new energy and cost saving practices in their daily operations both ashore and afloat in hopes of achieving SECNAV's energy goals.

Be on the lookout for exciting digital publications, videos, mobile apps, and more. This is not just an awareness campaign—it's an opportunity for two-way dialogue and feedback. We want to hear from you. Please send us your ideas at <http://greenfleet.dodlive.mil/energy/energy-efficiency-idea>.



facebook.com/NavalEnergy



@NavalEnergy

<http://greenfleet.dodlive.mil/energy>



DID YOU KNOW?

Did you know the USS Makin Island (LHD-8) saved the Navy more than \$10 million by setting its electric motors at low speed?



How did I save energy for the Navy?

My shipmates and I saved the Navy about 10 million dollars in fuel costs simply by setting the ship's electric motors at low speed.

Name: Machinist Mate 2nd Class (MM2) Petty Officer Zachary Long

Age: 24

Hometown: Lafayette, Indiana

Job: Assistant Oil King

Command: USS Makin Island

As the Assistant Oil King aboard USS Makin Island, I'm in charge of testing and transferring up to 1.8 million gallons of fuel (F-76), 10,000 gallons of lube oil (2190, 23699, SAE 40) and 165,000 gallons of potable water every day. I transfer the fuel necessary to run the gas turbines and diesel generators. The speed the ship travels determines how much fuel I need to transfer.

Setting the ship's electric motors at low speed enables us to burn less fuel, which in turn saves the Navy money—more than 10 million dollars at last count.

It's important to save fuel because any penny we save can be put toward maintaining our mission readiness. Turning off the lights, saving electricity—it all helps to save fuel. These and other efforts earned the ship a SECNAV Energy Conservation award in 2012. And because of our commitment to saving energy, we say that USS Makin Island is the Navy's first "Toyota Prius."



ENERGY SECURITY ENHANCES COMBAT CAPABILITY



NESDI & ONR Sponsor Technology to Control Paint Overspray in Shipyards

Enclosure Prevents Paint Contaminants from Reaching Air & Water

ENGINEERS FROM THE Naval Surface Warfare Center, Carderock Division's (NSWCCD) Environmental Quality Division have developed and tested a means to capture the overspray generated during hull painting operations—the Motion Assisted Environmental Enclosure (MAEE).

dry dock floor and surrounding areas where they may be discharged into nearby waterways.

In an effort to address this challenge, NSWCCD, in conjunction with NORX, LLC and Concurrent Technologies Corporation, developed MAEE technology to mitigate the

tive, contact-free seal with the hull to prevent the overspray from escaping. The seal around the shroud is a pressurized zone created by a flow of air similar to an air curtain. Blowers on the enclosure clear paint overspray and fumes away from the periphery and the painter and deposit them

The more efficient the hull coating is, the greater the fuel economy of the vessel, and the less future maintenance will be required.

The hull coating process is critical to the preservation of a ship's hull. The more efficient the hull coating is, the greater the fuel economy of the vessel, and the less future maintenance will be required—resulting in less time in dry dock and reduced ownership costs. For these reasons, anti-fouling coatings, which contain copper and zinc, are utilized.

During the spray paint application process, some of the paint does not adhere to the surface of the ship. This “overspray” carries heavy metals and other hazardous materials onto the

release of these paint contaminants into the environment.

MAEE is a portable, lightweight, inexpensive enclosure that attaches to a standard aerial work platform (AWP). The MAEE enclosure allows a painter to apply coatings to a ship's hull with standard shipyard spray equipment. The rectangular containment unit, or shroud, which covers approximately 60 square feet of the hull, allows an operator to access the surface to be painted, draws and circulates air from within the enclosure to contain the overspray, and generates a posi-

onto the enclosure's filters. (Note: A patent for the MAEE has been granted to the developer of the enclosure—NORX, LLC (U.S. Patent 8,499,716).)

Using the MAEE system's micro-computer, the operator specifies a desired direction (up, down or steady) and a speed based on their particular level of expertise and proficiency with the application of the coating (paint). A system of sensors and computers on the MAEE's work platform detect the position of the hull as well as the positions of the aerial work platform's joints. The control system's micro-

computer converts the operator's instructions into commands that follow the hull's surface at a fixed standoff distance of four to six inches. As the paint is applied, the shroud constantly moves along the surface, exposing more of the surface to be painted. The painter simultaneously paints while the system moves along the surface of the ship. The painter only needs to periodically stop and relocate the basket once a full pass is complete. This eliminates a designated platform operator from the process.

To reduce system costs and improve safety, the MAEE controller does not require any significant or permanent modifications to the boomlift. Modifications are easily

assembled and can be completed in about an hour. The boomlift is then readily deployable for other shipyard activities or may be returned to a rental company without incurring any additional charges. The boomlift's integral safety systems remain fully intact and functional.

MAEE Development

Though more broadly capable, MAEE is designed to be used on the hulls of submarines and surface ships. The MAEE system consists of two components:

1. Motion Assistance Component

This component, which can be used independently of other system components, coordinates the motion of the MAEE platform's actuators, allowing it to follow a hull surface without direct input from the operator.

2. Tool Component

This environmental enclosure is a lightweight structural framework with a positive air pressure seal configured around the perimeter that directs air to entrain and direct paint overspray particles onto replaceable filters within the enclosure.



A painter operates an earlier MAEE prototype during testing at BAE Systems in Jacksonville, FL.
Naval Surface Warfare Center, Carderock Division

The maturing MAEE enclosure technology has been tested and evaluated in a series of progressive shipyard operational assessments conducted by shipyard and research and development personnel under representative hull painting conditions. Following each test, prototype modifications and refinements were made based on recommendations from operators trained on the system and shipyard process management personnel.

Advanced prototype development must reconcile increased performance with requirements for expanded system functionality on curved surfaces with safety requirements, limits on overall enclosure weight, and requirements for structural sturdiness.

The original MAEE enclosure design distributed numerous blowers around the perimeter on a metal plenum (chamber) with rigid vanes to direct the air towards the hull surface.

The new design uses fewer blowers to feed air into a lightweight, tube-shaped perimeter plenum. The new plenum directs the air towards the surface through a series of openings in flexible tube. It is lighter and simpler and



Paint capture testing of the new MAEE plenum being conducted at the OT Neighoff paint facility in Glen Burnie, MD.
Naval Surface Warfare Center, Carderock Division

other shipyard activities or may be returned to the rental company. The AWP's integral safety systems remain fully intact and functional, as required by American National Standard ANSI/SIA A92.5—2006 "Boom Supported Elevating Work Platforms."

Some tasks remain to ensure the successful transition of MAEE technology into shipyard operations. The first is to receive additional acknowledgement from JLG Industries (the original equipment manufacturer of the AWP) for extended testing and evaluation of the AWP by Navy shipyard users. This extended testing is needed to evaluate reliability and harden the system before MAEE can become a commercial product. Secondly, the system must also receive approval from the Occupational, Safety and Health Administration before a production-ready MAEE can be made available to all Navy and commercial shipyards by either purchase or lease agreement.

The MAEE project team is also considering additional project funding efforts through the National Shipbuilding Research Program (NSRP) via a Fiscal Year (FY) 2014 research announcement, and the Office of Naval Research's (ONR) Rapid Innovation Fund via a FY14 white paper.

The primary benefits of the MAEE are as follows:

requires a less elaborate support structure and fewer components. This design approach has the potential to meet the weight restrictions imposed by shipyard requirements that will enable use of the system within the unrestricted work zone of existing AWP's.

Paint capture testing of the new plenum has shown that a peripheral air seal enclosure is light enough to be carried on a standard AWP, can be successfully configured and operated to block the discharge of overspray into the environment. The latest test results indicate that the new plenum captures 98 percent of overspray along a flat surface.

To ensure the safety of the AWP, MAEE's motion controller does not require significant or permanent modifications to the AWP. Once disassembled, the AWP is then ready for

1. Virtually eliminates paint overspray and associated contaminants such as heavy metals into the atmosphere and water.
2. Enhances environmental compliance and reduces associated risk and liability associated with potential permit requirements and burden associated with by-product waste generation and management.
3. Reduces total ownership cost as a simple, sustainable, inexpensive and versatile production enhancement that is interchangeable and synergistic with existing coatings application systems and processes.
4. Maximizes use of existing shipyard assets, expertise and work flow characteristics to increase industrial productivity and enhance compliance with existing environmental requirements.



One of the MAEE's system evaluations was conducted on the amphibious transport dock ship USS Arlington (LPD 24) at the Huntington Ingalls Shipyard in Pascagoula, MS.
Northrop Grumman Shipbuilding



MCS2 Nick Scott

5. Does not alter existing shipyard equipment functionality or safety features. Is designed to be a quick on/off assembly to an AWP.

Project Support

Primary funding for this project was provided by the Chief of Naval Operation Energy and Environmental Readiness Division's Navy Environmental Sustainability Development to Integration (NESDI) program to address mature system configuration, demonstration, validation and initial integra-

tion efforts. (For more information about the NESDI program, visit www.nesdi.navy.mil.) ONR has also provided resources to develop effective perforated tube and sensor technology and to reduce enclosure weight while maintaining strength.

Continued advocacy and support for information exchange and further shipyard review and assessment for developing MAEE technology has been provided by Navy and commercial sources including the Naval Sea Systems Command 04XP (shipyard

industrial/technology insertion), 04RE (environmental), and 04RS (safety) offices, as well as the NSRP via their Surface Preparation and Coating and Environmental Technologies Panels. [↗](#)

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Proven Sustainability Approaches Advance Mission at Navy Installations

Efforts Include Energy & Water Conservation, Green Building Management Practices

THE SUMMER 2013 issue of *Currents* highlighted the activities of eight Navy installations as examples of proven approaches for cost-effectively improving operations, benefiting the environment while advancing the mission. This article brings the total number of highlighted installations to a dozen, showcasing four more examples of approaches worthy of imitation throughout the Navy.

Using Facility Energy & Potable Water More Efficiently

A Resource Efficiency Manager for Continuous Commissioning

Naval Base Kitsap and the Puget Sound Naval Shipyard and Intermediate Maintenance Facility in Bremerton, WA achieved significant energy and cost savings by procuring the services of a resource efficiency manager (REM) to conduct continuous commissioning on its buildings. Continuous commissioning is the process of optimizing the heating, ventilation and air conditioning (HVAC) system—along with the systems that supply the HVAC system—for the building's current operating requirements. Regular commissioning ensures that the building functions as it was originally designed, while continuous commissioning optimizes the building systems to meet the current needs of the facility.

The energy and associated cost savings generated by the REM in the last three years are shown in the table below. Most of the savings were realized by shifting from continuous operation of HVAC equipment, such as air handling units, exhaust fans, and heating coils, to single shift or daytime operation. The performance expectation for any improvement is a 200 percent return on investment, such that every dollar the facility invests in improvements returns two dollars in savings (not including the costs to contract the REM). As of spring 2013, the REM is still conducting continuous commissioning of facilities both at Naval Base Kitsap and the Puget Sound Naval Shipyard and Intermediate Maintenance Facility.

In addition to continuous commissioning, the facility implemented a systematic program to detect and repair leaks in the steam, water, and air systems. The repairs reduced the



Continuous commissioning optimizes a building's systems for current needs.
Ryan MacPherson

SAVINGS FROM CONTINUOUS COMMISSIONING

	FY 2010	FY 2011	FY 2012
Cost Savings	\$227,101	\$132,012	\$195,128
Energy Savings (million Btu)	20,898	12,105	12,183

NAS Jacksonville expects to be reclaiming 100 percent of its wastewater in late 2014 or early 2015.

facility's Fiscal Year (FY) 2010 water consumption by 11.5 million gallons compared to FY 2009. The facility also acquired over 9,600 megawatt hours of wind-generated electricity at no cost by using credits available under the Bonneville Power Administration's Conservation Rate Credit program. Naval Facilities Engineering Command Northwest was honored with a 2011 Federal Energy and Water Management Award for its efficiency work.

Low Water Aircraft Cleaning

The Fleet Readiness Center Southwest in San Diego, CA made significant efficiency improvements in its use of industrial and irrigation water. At its manufacturing and painting facilities, the installation installed a waterless steam cleaning system and low-water steam assist rinse, and retrofitted the aircraft washing hoses to be low volume. The switch is not only saving about 119,000 gallons of water every year, it is saving the facility an estimated \$150,000 per year, mostly by avoiding costs to treat and dispose of industrial wastewater. The installation also installed a highly efficient subsurface irrigation system that is yielding annual savings in outdoor water use of 120,000 gallons, a reduction of about one-third. The time for the combined projects to pay for themselves was less than one year.

Reclaiming Water from Wastewater

Naval Air Station (NAS) Jacksonville in Florida has long been using a minimal amount of potable water to irrigate its

golf course, because it gets much of the water needed to irrigate the course by capturing stormwater in a nearby retention pond. During dry periods, the base augmented the stormwater by pumping water from a formerly potable well located next to the pond. However, the neighboring private golf course (Timuquana Country Club) had been using a deep potable well to irrigate their golf course, drawing from the Florida aquifer that supplies fresh water to the area. Given local concerns over the long-term sustainability of the aquifer, combined with the fact that the station was discharging highly treated domestic wastewater into the St. John's River, NAS Jacksonville installed a water reuse system in 1998 to provide reclaimed wastewater to the country club as well as the station's own golf course. The country club paid all costs for the design, permitting and construction of the reuse pipeline and retention pond, in exchange for receiving the water at no cost. The \$1.9 million project prevents 18,000 pounds of nutrients per year from being discharged into the river, and it provides the country club with between 150,000 and 200,000 gallons of water per day, which otherwise would have been pulled from the Florida aquifer.

The country club uses only a portion of the wastewater treatment effluent, so the station continued to discharge the remainder of its treated wastewater into the St.

John's River under its National Pollutant Discharge Elimination System permit. Recently, however, NAS Jacksonville decided to reclaim 100 percent of its effluent due to a tighter restriction on the total maximum daily load of nitrogen that can be discharged into the river, imposed by both the U.S. Environmental Protection Agency and the State of Florida. Faced with the difficulty of meeting the new requirement, the station decided that the



The NAS Jacksonville golf course.
Miller Design



The NAS Jacksonville golf course is irrigated with a combination of captured stormwater and water reclaimed from the installation's wastewater treatment plant. The reclaimed water is delivered to the course through purple pipe color-coded for this purpose.

Clark Pierce

better route would be to expand its reclamation system to achieve zero discharge. In 2010, the station obtained the permits needed to expand the infrastructure to deliver an additional 300,000 gallons per day of reclaimed water to its own golf course and ball fields. The station also separated the stormwater retention pond at the NAS Jacksonville golf course into two reservoirs, one for stormwater and one for treated wastewater. Meanwhile, the station is designing an effluent spray field irrigation system to use the remainder of the reclaimed wastewater, which will entirely eliminate effluent discharge to the river. The permitting process was completed around the end of FY 2013, with six months of construction to follow. The station expects to be reclaiming 100 percent of its wastewater in late 2014 or early 2015.



Rear Adm. Scott Sanders, reserve deputy director for Joint and Coalition Warfighting, J7, Joint Staff, speaks during the dedication and ribbon cutting ceremony for the new NOSC Phoenix building at Luke Air Force Base.

Senior Chief Mass Communication Specialist Gary Ward

Improving Building Performance

The Naval Operational Support Center at Luke Air Force Base (NOSC Luke) in Glendale, AZ is a newly constructed design-build project completed in December 2011. It was certified at the Platinum level in March 2012 by the Leadership in Energy and Environmental Design (LEED) rating system

of the U.S. Green Building Council. The project was funded for only a LEED Silver certification, a considerably less difficult rating than Platinum, but the team was able to achieve Platinum using an efficient, integrated approach to project implementation.

Highlights of the sustainability features of the facility are as follows:

- A 67 kilowatt (kW) photovoltaic solar array, which generates an estimated 100,000 kWh per year of renewable electricity
- Advanced metering of energy and water consumption
- Building materials with high recycled content, sourced from local vendors
- Water-efficient plumbing fixtures
- Reflective roofing material
- Interior furnishings consisting of materials that emit little or no volatile organic compounds
- Demand-control ventilation that senses the number of occupants in the building and adjusts the ventilation accordingly
- Daylighting in 70 percent of rooms

More Energy-related Initiatives in the Pacific Northwest

FOR A SUMMARY of energy-related initiatives at other Navy installations in the Pacific Northwest, read our article entitled "A Look at a Long-Term Energy Strategy in the Pacific Northwest: A Strong Tradition of Success in Resource Efficiency Management" in the spring 2013 issue of *Currents*.





An F/A-18C Hornet assigned to Fleet Readiness Center Southwest flies over NAS North Island and the aircraft carrier USS John C. Stennis to commemorate the 30th anniversary of the first McDonnell Douglas/Boeing F/A-18 flight. This Hornet and other aircraft assigned to Fleet Readiness Center Southwest are kept clean with a waterless cleaning system.

Lt. Alex Allwein

- A high-efficiency chiller
- High performance insulation for the building envelope
- Variable frequency drives in the mechanical system

- Landscaping with native and other low-water species.

The facility uses 47 percent less water than a typical building, and 39 percent less energy than a building constructed according to the American Society of Heating, Refrigerating and Air-Conditioning Engineers standard 90.1 (2004), “Energy Standard for Buildings except Low-Rise Residential Buildings.” During the construction process, 88 percent of construction and demolition debris was diverted from disposal. The \$11.2 million facility was designed to house 750 Navy Reservists. It is 32,055 square feet in area, occupying one-story on 1.85 acres.

The successful approaches described here—continuous commissioning of building systems, low-water aircraft cleaning, irrigating with reclaimed wastewater, and constructing high performance buildings—are proven strategies suitable for widespread adoption across the Navy. ⚓

For More Insights

FOR MORE INSIGHTS into the Navy’s sustainability efforts, read our article entitled “Sustainability Approaches Proven Successful at Naval Installations: Efforts Range from Using Facility Energy More Efficiently to Diverting Construction & Demolition Debris” in the summer 2013 issue of *Currents*. To subscribe to the magazine or browse the *Currents* archives, visit the Department of the Navy’s Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.



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Navy Among Winners Recognized at 2013 Federal Energy & Water Managements Awards Ceremony

Awards Recognize Federal Employees & Their Partners for Energy & Water Saving Achievements

THREE NAVY WINNERS were among 25 individuals and teams recognized for their contributions to energy and water efficiency within the federal government during the 2013 Federal Energy and Water Management Awards ceremony in Washington, D.C. on November 6, 2013.

The U.S. Department of Energy (DoE) Federal Energy Management Program (FEMP) sponsors the annual awards, which recognize individuals, groups, and agencies across the federal government for outstanding achievements in energy and water efficiency and conservation, renewable energy implementation, sustainable practices for high-performance buildings, and fleet and transportation management.

The Department of Defense received 13 of the 25 awards, with the Navy receiving three, the Marine Corps receiving three, the Army receiving two, and the Air Force receiving five. Navy winners and their achievements are described below.

Individual Award for Exceptional Service

Sandrine Schultz

*U.S. Department of the Navy
Commander, Navy Installations Command
Washington, D.C.*

As the Navy Installations Command Energy Program Manager, Ms. Sandrine Schultz works to heighten energy awareness, improve energy efficiency, and help meet the Secretary of the Navy's energy goals through smart investments. Ms. Schultz approved and funded 147 energy and water projects implemented in fiscal year (FY) 2012 that resulted in total energy and water savings of 1.2 trillion British thermal units (BTU) and 335 million gallons, respectively—with energy and water cost avoidance totaling more than \$89.1 million. She also directed six third-party-financed energy projects that are saving the Navy an additional \$13.6 million annually.

Ms. Schultz established innovative tools, such as the Navy Shore Geospatial Energy Module and the Energy Return

on Investments tool, to inform Navy Shore Energy investment decisions and analyze energy initiatives to assure accurate return on investments data is used to inform investments of limited program resources.

Ms. Schultz is committed to integrating energy across all operational areas. Her contributions to the development of Navy-wide energy implementation plans have been instrumental in the institutionalization of Navy policy, strategy, and energy efficiency.

Team Award for Programs

*Naval Sea Systems Command
Naval Surface Warfare Center Carderock Division
U.S. Department of the Navy
Philadelphia, Pennsylvania*

In FY 2012, Naval Surface Warfare Center Carderock Division (NSWCCD) executed energy conservation projects across its facilities at nine sites, resulting in \$4.3



million in annual cost avoidance. Projects executed during FY 2012 include repairs to major heating and cooling systems, steam decentralization, building envelope repairs, and two military construction (MILCON) energy enhancement projects.

The MILCON projects included construction of a Leadership in Energy and Environmental Design (LEED) Gold-certified facility in West Bethesda, Maryland, equipped with a 21-kilowatt photovoltaic array, solar domestic hot water, and a vegetative roof. High-pressure natural gas infrastructure was provided for the newly constructed Electric Drive Test Site, which reduces both costs and greenhouse gas emissions over the petroleum fuel alternative. NSWCCD also established an aggressive direct digital control monitoring system to ensure building systems and set points continue to operate at optimal efficiency.

With the successful implementation of these initiatives and continued development of new projects, NSWCCD is on track to meet its mandated energy reduction goals. As of FY 2012, NSWCCD reduced its energy intensity by more than 22 percent, saving 97 billion Btu over the FY 2003 baseline.

To learn more about the FEMP Awards and see all of the 2013 winners, please visit www1.eere.energy.gov/femp/services/awards_fewm2013.html.

Team Award for Projects

Commander, Fleet Activities Yokosuka, Japan
U.S. Department of the Navy
Yokosuka Naval Base, Japan

Commander, Fleet Activities Yokosuka (CFAY) deployed a strategy to use more advanced technologies to improve energy efficiency across the installation, executing \$7.2 million in projects in FY 2012 to save about 7.9 billion Btu, 1.3 million gallons of water, and \$625,000 in utility costs annually.


CFAY completed an extensive energy retrofit project to replace existing exit signs with more than 5,600 light

emitting capacitor (LEC) exit signs throughout the main base and all CFAY satellite locations—representing the largest utilization of LEC technology to date across federal government sites. CFAY also installed two large solar energy projects, including one that used an innovative building integrated photovoltaic (BIPV) system (thin flexible panels) for an arched roof building that would not accommodate traditional flat panels. The 396-kilowatt system is the U.S. Navy's largest solar BIPV thin-film installation.



CFAY has already reduced its energy intensity by 58 percent relative to the FY 2003 baseline, and the total of 746 kilowatts installed in FY 2012 helps CFAY further reduce its dependence on the Japanese power grid.

The 2013 awards were presented by Dr. Timothy Unruh, FEMP Director, with remarks from Mike Carr, Principal Deputy Secretary for DoE's Office of Energy Efficiency and Renewable Energy, and the Honorable Dennis V. McGinn, Assistant Secretary of the Navy for Energy, Installations, and Environment.

To learn more about the FEMP Awards and see all of the 2013 winners, please visit www1.eere.energy.gov/femp/services/awards_fewm2013.html. 

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Navy Veterans Honored as “Champions of Change”

White House Praises Veterans for Their Work Advancing Clean Energy & Climate Security

ON NOVEMBER 5, 2013, the White House honored twelve veterans and leaders as “Champions of Change” for their service in advancing clean energy initiatives and promoting greater climate security. Three Navy veterans were among the service members recognized. Their award-winning work is summarized below.

Elizabeth Perez-Halperin

Elizabeth Perez-Halperin is the founder and Chief Executive Officer (CEO) of GC Green in San Diego, California. GC Green is a renewable energy general contracting and consulting firm that provides veteran outreach, education, training, and job placement in the clean technology industry throughout California. Since its founding in 2010, GC Green has served more than 1,300 individuals by providing training opportunities in the renewable energy industry, teaching entrepreneurship skills, and providing clean technology industry job placement assistance.

Ms. Perez-Halperin served in the U.S. Navy for over eight years as an Aviation Logistics Specialist and was discharged honorably as a Wounded Warrior Veteran. During her service, she recognized that the root causes of conflict can be reduced through resource efficiency and by broadly embracing sustainable practices. Since her transition, she has used her expertise and experience to build a growing coalition using education, training, and internships to place veterans in jobs in the clean energy industry. In addition to running her own company, she serves on the San Diego State Sustainability Advisory Board as a job creation champion and is involved with Operation Free of the Truman National Security Project, a nationwide coalition of veterans and nationals security experts who advocate for securing America with clean energy. She also created the first Military Cleantech Hub for Veteran Entrepreneurs in the emerging clean tech industry.

Nat Kreamer

Nat Kreamer is the president and CEO of Clean Power Finance in San Francisco, California. Clean Power Finance is a leading software and financial services



provider to the U.S. solar industry. He serves on Clean Power Finance’s board of directors and is the vice chairman of the board of directors of the Solar Energy Industries Association, the largest solar trade organization in the nation.

Mr. Kreamer served as a U.S. Navy officer with the Joint Special Operations Command. While serving in Afghanistan, he saw first-hand the depth of the energy importation industry. Upon returning home from service, he wanted to repower America with clean, affordable domestic energy, and turned his idea of solar financing into co-founding SunRun as it became a leading provider of residential solar financing. With his first residential solar power purchase agreement in 2007, he helped to kick start a multi-billion-dollar residential solar financing industry, which created several thousands of domestic jobs and helped hundreds of thousands of Americans save money with clean, affordable domestic energy.

Andrea Marr

Andrea Marr is a commissioning engineer at McKinstry Company's Irvine office in California, where she advises large institutions on energy efficiency strategies. She has retrofitted buildings in Orange and Los Angeles counties with clean energy solutions, such as solar panels for businesses and schools. She is also involved with Operation Free. Prior to joining McKinstry, she worked for a small non-profit in Nicaragua designing and installing wind turbines and solar panels in rural communities without access to the national electric grid.

Ms. Marr served as a Gunnery Officer on two deployments in support of Operation Iraqi Freedom and as a Nuclear Engineering Officer for a third deployment. Working on oil platform security for the Navy led her to look into energy efficiency in buildings as an alternative to the vulnerabilities of fossil fuels.

You've recognized that the energy security challenge we face in our military operations is akin [to] the energy challenge we face at home in our civilian lives.

—The Honorable Sharon Burke

About the Champions of Change Program

The Champions of Change program was created as an opportunity for the White House to feature individuals doing extraordinary work in their communities to innovate, inspire, and educate the rest of the world. Every week, the White House invites Champions of Change winners to Washington, D.C., to share their stories and ideas with senior representatives from the White House and Obama administration over a roundtable discussion. The week of November 4 recognized American veterans of Iraq and Afghanistan who are using the skills they learned in the armed services to advance clean energy and increase climate resilience and preparedness in their communities.

"Many veterans see a strong link between their experiences in Iraq and Afghanistan and their commitment to energy security," said the Honorable Sharon Burke, As-

stant Secretary of Defense for Operational Energy Plans and Programs, at the event.

"As civilians, you've connected the dots," Secretary Burke said to the veterans being honored. "You're doing something about it. You've recognized that the energy security challenge we face in our military operations is akin [to] the energy challenge we face at home in our civilian lives, and that's why I understand a lot of you are promoting a clean energy transition for this country. It's a hard problem to solve, but if anyone's going to do it, it will be all of you."

"Thank you for your prior and future service in serving our independence goals in so many different directions," said Dr. Ernest Moniz, the Secretary of Energy.

The event was attended by senior representatives from the White House and Obama administration, including Dennis McDonough, the President's Chief of Staff; Dr. Ernest Moniz; Nancy Sutley, head of the White House Council on Environmental Quality; and several senior leaders from the Department of Defense.

To learn more about the White House Champions of



Change, visit www.whitehouse.gov/champions. 

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CNO Calls for Environmental Awards Nominations

Submission Deadline was January 10, 2014

REAR ADMIRAL KEVIN SLATES, director of the Chief of Naval Operations (CNO) Energy and Environmental Readiness Division (OPNAV N45), issued a formal call for nominations to Echelon 2 commands on October 21, 2013 to solicit nominations for the fiscal year (FY) 2013 CNO Environmental Awards competition.

The annual CNO Environmental Awards recognize Navy ships, installations, and people for outstanding environmental performance. The achievement period for the FY 2013 competition is October 1, 2011 through September 30, 2013.

Award nominations must be submitted to OPNAV N45 via Echelon 2 commands. The deadline to submit nominations was January 10, 2014.



The aircraft carrier USS Enterprise (CVN 65), FY 2011 CNO Environmental Award winner in the Environmental Quality (Large Ship) category.
MC Seaman Harry Andrew Gordon

Echelon 2 commands may submit nominations for each of the following 10 award categories:

1. Natural Resources Conservation (Small Installation)
2. Natural Resources Conservation (Individual/Team)
3. Environmental Quality (Non-industrial Installation)

4. Environmental Quality (Individual/Team)
5. Environmental Quality (Large Ship)
6. Sustainability (Industrial Installation)
7. Environmental Restoration (Installation)
8. Environmental Restoration (Individual/Team)
9. Cultural Resources Management (Installation)
10. Environmental Excellence in Weapon System Acquisition, Large Program (Individual/Team)




For more information about the CNO Environmental Awards program, visit <http://dld.bz/cno-env-awards>.

Up to five nominations per category may be submitted for each of the individual/team and ship award categories. There is no restriction on the number of installation nominations that will be accepted for the installation award categories.

Echelon 2 commands must submit nomination packages electronically via the CNO Environmental Awards website (<http://cnoenviroawards.com>). No paper copy or CD submittals will be accepted. Each Echelon 2 command will be provided a username and password for logging into the system to upload nomination packages.

Environmental experts from the government and private sector will evaluate nominations and determine winners at the CNO level of competition. CNO winners will advance to the Secretary of the Navy (SECNAV) Environmental Awards competition. Likewise, with the exception of winners in the Environmental Quality (Large Ship) category—which is unique to the CNO and SECNAV levels of competition—SECNAV winners will advance to the Secretary of Defense Environmental Awards competition.

For more information about the CNO Environmental Awards program, visit <http://dld.bz/cno-env-awards>. 

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Northwest Installations Pull the Plug on Energy Waste

Efforts Include Energy Tracking & Building Consolidation

FACILITY AND ENERGY managers from Northwest Navy bases are taking aggressive steps to increase the energy efficiency of their facilities including efforts to delamp light fixtures, track energy usage, and consolidate personnel from four buildings into three.

The Naval Base Kitsap Bangor energy team has been working with facility managers to aggressively delamp light fixtures in office areas, selectively removing lamps to reduce overall energy use while maintaining adequate light levels for specific tasks. The energy team at Naval Base Kitsap Bremerton is reaching out to all hands by displaying energy messages on reader boards and running articles in the base newspaper, reminding everyone on base to reduce waste and shut lights and equipment off when not needed.



The Naval Station Everett energy team is tracking energy use by the top ten energy consuming facilities and visiting facility managers to discuss energy saving opportunities. This has improved communication between the energy office and facility managers and helped with the implementation of energy saving measures that are more

aggressive than those adopted in the past, such as changing cooling set points from 76 to 80 degrees and heating set points from 68 to 66 degrees.

Naval Station Everett facility managers have also delamped fixtures to reduce light levels in hallways, which are often brighter than required for safe passage.

All Northwest Navy installations have made an effort to confirm that heating and cooling system schedules match occupancy schedules.

Following aircraft carrier deployment, Naval Station Everett managers consolidated personnel from four bachelor enlisted quarters into three. Since placing the uninhabited building in caretaker status with a 60 degree heating set point and reducing hallway lighting and ventilation system operation, significant energy savings have been realized at this building. These measures have resulted in a 15 percent overall energy savings on base, exceeding the base's 10 percent reduction target.

Naval Air Station Whidbey Island verified a 5.5 percent overall reduction in energy use after aligning schedules. Some of their facilities demonstrated savings as high as 23 percent.

All Northwest Navy installations have made an effort to confirm that heating and cooling system schedules match occupancy schedules and that temperature set points are maintained to maximize energy savings. ⚓

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NESDI FY14 Needs Solicitation Yields Priority Needs

Annual Process Taps Unresolved Environmental Needs from the Fleet

THE NAVY ENVIRONMENTAL Sustainability Development to Integration (NESDI) program's Fiscal Year (FY) 2014 needs collection process yielded 17 priority needs from across the Fleet.

Each year, the NESDI program executes a formal process for collecting unresolved environmental needs from the Fleet. Fleet personnel or their representatives actively participate in this process to identify and document their operational challenges.

After a thorough review by program personnel, a solicitation for proposals has been executed to address these 17 needs that were determined to be priorities by personnel from the program's management team, the Technology Development Working Group (TDWG), and its resource sponsor, the Chief of Naval Operations Energy and Environmental Readiness Division (CNO N45). Proposals that are successful in addressing the requirements as stated in these priority needs will result in new projects beginning in FY14 and beyond.

Dates Set for Remaining Fiscal Year 2014 In-Progress Review

EACH YEAR, THE NESDI program holds In-Progress Reviews (IPR) to check in on the progress made by the program's Principal Investigators and make sure that their efforts will achieve the intended results. These annual reviews bring together end users, resource sponsor representatives, and researchers—strengthening the gap between the research and required integration efforts. Each year, dozens of participants attend or dial in to hear briefings about ongoing projects and to provide valuable feedback to the program's Principal Investigators.

Due the travel restrictions still in place for many of its Principal Investigators, the program decided to combine its west and east coast IPRs this year into a single IPR that will be held the week of 5–9 May 2014 in Port Hueneme, CA.

The TDWG is comprised of technical experts from the Naval Air Systems Command (NAVAIR), Naval Sea Systems Command (NAVSEA), Naval Facilities Engineering Command (NAVFAC), Space and Naval Warfare Systems Command (SPAWAR), and the Naval Supply Systems Command (NAVSUP).



Once needs were compiled, the TDWG met to consider all of the needs, determining whether a need was valid (within the scope of the NESDI program, not already being addressed by the program, etc.). The TDWG then ranked those needs based on the program's investment priorities. A need can be considered by the NESDI program if it falls within one of the following Environmental Enabling Capabilities (EEC):

1. **Range Sustainment (EEC-2)**
Investments in innovations that address environmental impacts and restrictions at Navy ranges to ensure that naval training ranges and munitions testing/manufacturing ranges are fully available and efficiently utilized.
2. **Ship-to-shore Interface (EEC-4)**
Investments in innovative techniques to manage ship hazardous material/waste offload to shore facilities.
3. **Weapon System Sustainment (EEC-3)**
Investments in Fleet maintenance operations with the overall objectives of reducing the cost of compliance and increasing mission readiness.
4. **Air and Port Operations (EEC-4)**
Investments that address issues pertaining to air and port operations that ensure Fleet readiness.
5. **Regulatory and Base Operations (EEC-5)**
Investments in cost effective methods for identifying, analyzing and managing environmental constraints related to current and projected regulatory impacts.

Once the TDWG had completed its rankings, those preliminary rankings were passed along to the appropriate Subject Matter Experts (SME) at CNO N45. Once these SMEs had reviewed and approved the TDWG's preliminary rankings, Leslie Karr, the NESDI program manager, then published a request for pre-proposals via the program's website to address needs that were deemed priorities by program personnel and its resource sponsor.

Priority Fleet Needs

NEEDS THAT POSE significant operational risk to the Fleet and fit the program's investment priorities were the most highly ranked. The following 17 priority Fleet operational needs (with environmental solutions) resulted from the program's validation, consolidation and ranking process for FY14.


NEED	COMMAND	TITLE
N-0914-14	NAVFAC	Flushing of Potable Water Distribution Lines to Maintain Chlorine Residual
N-0925-14	NAVFAC	Web-Based Enterprise Hazardous Waste Database Application
N-0937-14	NAVAIR	Leaking Thermosetting Elastomer Bomb Sealant in General Purpose Bombs
N-0944-14	NAVFAC	Long-Term Integrated Sediment Management Strategy to Ensure Resiliency of Mission Critical Infrastructure
N-0946-14	USFF	Multi-Spectral Weapon Impact Detection System
N-0948-14	NAVSEA	Design Closed-Loop Cooling Water System to Accommodate Ships' Cooling Water Needs
N-0951-14	NAVAIR	Environmental Effects Certification Protocol for Navy Tactical Fuels
N-0952-14	NAVAIR	Trivalent Chromium Conversion Coating—Enhanced Coloration of Aluminum Substrates
N-0953-14	Other	New Methods for Assessing Biological Response Metrics for Eutrophication Total Maximum Daily Loads
N-0956-14	NAVFAC	In-Situ Discharge Monitoring
N-0960-14	NAVFAC	How Building Characteristics Affect Vapor Intrusion Potential Into Industrial Buildings
N-0961-14	NAVFAC	How Significant is Temporal Variability of Vapor Intrusion Data Associated with Industrial Buildings
N-0965-14	NAVFAC	Perfluorochemicals on Naval Installations
N-0970-14	NAVAIR	Corrosion Detection without Surface Coating Removal
N-0978-14	NAVSEA	Drydock Effluent Filtration System
N-0989-14	NAVFAC	Underwater Low Environmental Impact, Munitions Breaching Technology
N-0990-14	NAVSEA	Develop an Automated Real-Time Opacity Monitor for Use in Determining the Opacity of Fugitive Emissions in lieu of EPA Method 9

TDWG Membership

MEMBERS OF THE NESDI program's TDWG can be contacted at the following phone numbers and email addresses:

NAME	COMMAND	PHONE	EMAIL
Karr, Leslie (Chair)	NAVFAC	805-982-1618	leslie.karr@navy.mil
Bendick, John	NAVSUP	717-605-9144	john.bendick@navy.mil
Brock, Dave	NAVAIR	904-790-6398	david.l.brock@navy.mil
Cahoon, Lynn	NAVAIR	252-464-8141	albert.cahoon@navy.mil
Earley, Pat	SPAWAR	619-553-2768	patrick.earley@navy.mil
Hertel, Bill	NAVSEA	301-227-5259	william.hertel@navy.mil
McCaffrey, Bruce	Consultant	773-376-6200	brucemccaffrey@sbcglobal.net
Rasmussen, Eric	NAVAIR	732-323-7481	eric.rasmussen@navy.mil
Sugiyama, Barbara	NAVFAC	805-982-1668	barbara.sugiyama@navy.mil
Webber, Cindy	NAVAIR	760-939-2060	cynthia.webber@navy.mil

The deadline for pre-proposals that address these priority needs was 13 November 2013. After this date, pre-proposals received were evaluated and ranked by a representative from each of the program's Functional Working Groups and the TDWG. The call for full proposals was issued on 12 December 2013.

For more information about the FY14 priority needs as well as other information about the NESDI program, visit the program's web site at www.nesdi.navy.mil. 

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Navy Announces Winners of 2013 Community Service Environmental Stewardship Awards

Awards Showcase Navy Commitment to Local Communities

VICE ADMIRAL PHILIP H. CULLOM, deputy chief of naval operations for fleet readiness and logistics (N4), announced the winners and honorable mentions of the 2013 Navy Community Service Environmental Stewardship Flagship (NCS-ESF) Awards competition.

The annual NCS-ESF Awards competition, sponsored by N4, recognizes Navy military and civilian personnel who volunteer for meaningful command-sponsored community service projects that strengthen education, promote good stewardship of environmental resources, and showcase the Navy's commitment to the local community.

Winners of this year's NCS-ESF Awards were selected from a list of 20 nominations from across the globe. The winners, by category, are:

Shore command category:

- Small (under 200 personnel): Navy Operational Support Center Battle Creek, Augusta, MI



Members of the Pensacola Area Chief Petty Officer Association, including active duty and retired chief, senior chief and master chief petty officers, pick up trash along a stretch of highway on Perdido Key, FL.

MC Russ Tafuri



Sailors assigned to Naval Air Station Whidbey Island and tenant commands take part in the 17th annual Dumpster Dive, an opportunity to educate Sailors about recycling throughout the community.

MC2 Emmanuel Rios

- Medium (200 to 499 personnel): Navy and Marine Corps Intelligence Training Center, Virginia Beach, VA
- Large (500 or more personnel): Naval Air Station Whidbey Island, WA

Sea command category:

- Small: FBM Operational Test Support Unit TWO, Cape Canaveral, FL
- Medium: 1st Dental Battalion/Naval Dental Center Camp Pendleton, CA
- Large: USS Nimitz (CVN 68)

Overseas command category:

- Small: Navy Munitions Command, East Asia Division, Unit Guam
- Large: USS Frank Cable (AS 40)

Commands receiving honorable mentions include:

- Small shore category: Naval Support Activity Lakehurst, NJ
- Medium shore category: Naval Air Station Meridian, MS
- Large shore category: Naval Air Station Pensacola, FL
- Small sea category: 21st Dental Company, Hawaii
- Large sea category: USS Abraham Lincoln (CVN 72)

This year's awardees organized numerous efforts with community partners to make positive changes to the environment. Examples of winning initiatives include youth

education and environmental awareness outreach, command recycling programs, Earth Day events, environmental restoration projects, and natural resource protection through community clean-ups.

For additional information about the NCS-ESF Awards, visit <http://dld.bz/ncs-esf-awards>.

The 2013 NCS-ESF Award winners will receive commemorative plaques and honorable mentions will receive signed certificates from N4.

The NCS-ESF Award is one of six categories in the Navy Community Service Awards Program (NCSP), which annually recognizes Navy commands that engage in exemplary voluntary community service activities.

The other NCSP award categories include:

- The USS BAINBRIDGE (CGN 25) Award for Overall Excellence
- Personal Excellence Partnership Flagship Award
- Health, Safety, and Fitness Flagship Award
- Campaign Drug Free Flagship Award
- Project Good Neighbor Flagship Award

For additional information about the NCS-ESF Awards, visit <http://dld.bz/ncs-esf-awards>. 

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Be Part of the Navy's Best Magazine • Submit Your Story by 18 April

Have some good news about your energy or environmental program? Want to share it with others? *Currents* is the place to do it. *Currents*, the Navy's official energy and environmental magazine, has won first place in the Navy's Chief of Information Merit awards competition three times. And it's people like you and the stories you submit that make *Currents* the best magazine in the Navy.

Your experiences take on new meaning when you share them with *Currents* readers and on Facebook.

So if you have a story that you'd like us to promote in our summer 2014 issue, submit your text and images by Friday, 18 April 2014. Any submissions received after this date will be considered for our fall 2014 issue.

You can get a copy of the *Currents* article template by sending an email to Bruce McCaffrey, our Managing Editor, at brucemccaffrey@sbcglobal.net. This template has proven to be a tremendous asset in helping us edit and track your article submissions. And don't worry. If writing isn't one of your strengths, we'll handle all of the editing necessary to get your submission into publishable form.

Bruce is also available at 773-376-6200 if you have any questions or would like to discuss your story ideas.

As a reminder, your Public Affairs Officer must approve your article before we can consider it for inclusion in the magazine.

Don't forget to "like" us on Facebook at www.facebook.com/navycurrents. *Currents'* Facebook page helps expand the reach of the magazine and spread the news about all the great work you're doing as the Navy's energy and environmental guardians. And your experiences take on new meaning when you share them with *Currents* readers and on Facebook.

Currents Deadlines

Summer 2014 Issue: Friday, 18 April 2014
Fall 2014 Issue: Friday, 18 July 2014
Winter 2015 Issue: Friday, 17 October 2014
Spring 2015 Issue: Friday, 16 January 2015

You can also refer to your *Currents* calendar for reminders about these deadlines.

Aviation Survival Training Center Goes Solar

Alternative Energy Project Produces One Million BTUs Per Hour

AFTER THREE YEARS in operation, one of the Navy's alternative energy projects at the Aviation Survival Training Center (ASTC) in Jacksonville, Florida is proving nearly twice as effective as originally estimated.

The project was originally projected to save the Navy \$90,750 per year and to have a payback of roughly 11 years. However, three years of moni-

ously eliminating the carbon emissions resulting from the use of natural gas boilers or other fossil fuel combustion processes, is an incredible success for the Navy."

This project is an integrated solar thermal and natural gas system that replaces the obsolete steam heating system that had been in operation on Naval Air Station (NAS) Jack-

The most prominent part of the system are the solar thermal panels on the roof. Water pumped through these collectors serves to absorb solar energy. The heated water then flows from the collectors to two large drain back tanks, one each for the pool and the domestic water system. A heat exchanger located in each tank then transfers the solar energy to the water used in the pool and the domestic hot

Projects like this are the kind our Navy is looking for
to reduce our dependency on fossil fuels.

—Rear Adm. Eleanor Valentin

toring reveal that the project is actually producing a savings of \$171,700 annually, which will result in a payback of approximately six years. This is a big step toward achieving the Secretary of the Navy's goal of producing at least half of shore-based energy requirements from renewable sources by 2020. According to Installation Energy Manager Joshua Bass, "When economically viable, renewable energy projects provide a tremendous benefit for both the taxpayer and the environment. To be able to save the taxpayer's more than \$170,000 a year while simultane-

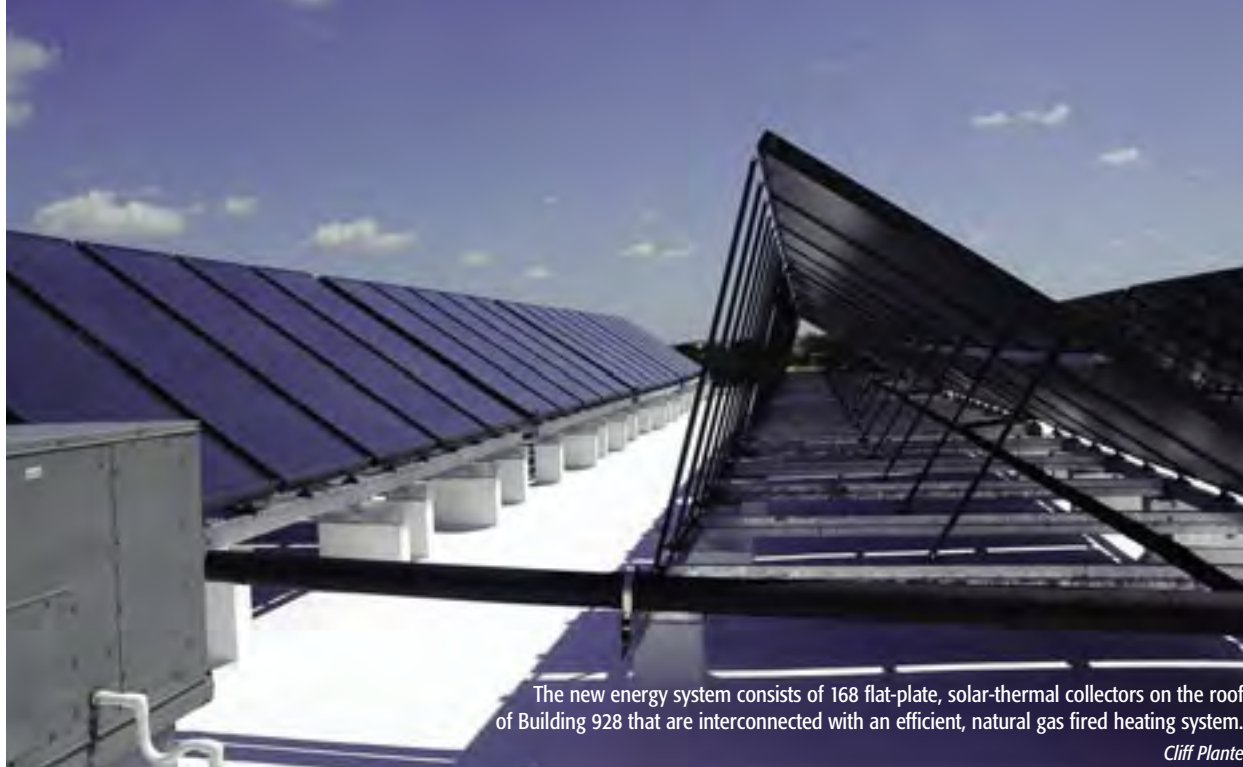
ously eliminating the carbon emissions resulting from the use of natural gas boilers or other fossil fuel combustion processes, is an incredible success for the Navy."

This project is an integrated solar thermal and natural gas system that replaces the obsolete steam heating system that had been in operation on Naval Air Station (NAS) Jacksonville for decades. The complete system consists of natural gas fired unit heaters for space heating and solar thermal panels for pool and domestic hot water heating. There are six natural gas fired unit heaters to heat the pool, one heater for the shop area, and one unit for the drying room. (Note: The pool area did not receive heat of any type when the building was steam heated.) There are 168 flat plate collectors, each four feet by ten feet, along with drain back tanks, heat exchangers, controllers, pumps, and pipes that interconnect the systems in the building.

water system, respectively. The water from the heat exchanger is then pumped back up to the solar thermal panels to start the process over again.

The project was funded by Navy Bureau of Medicine and Surgery (BUMED) and administered by Naval Facilities Engineering Command (NAVFAC) Southeast, Public Works Department Jacksonville. Since the ribbon cutting ceremony nearly two years ago, NAS Jacksonville has reaped significant benefits in terms of energy generation and efficiency gains.

The former Resource Efficiency Manager at NAS Jacksonville stated,



The new energy system consists of 168 flat-plate, solar-thermal collectors on the roof of Building 928 that are interconnected with an efficient, natural gas fired heating system.

Cliff Plante

“On a cloudless day, the solar panels produce one million BTUs of energy per hour—enough to heat the center’s 270,000-gallon pool by one degree every two hours.”

Rear Adm. Eleanor Valentin, commander, Navy Medicine Support Command agreed when she said, “Projects like this are the kind our

Navy is looking for to reduce our dependency on fossil fuels.”

“ASTC Jacksonville is vital to warfighter readiness by training more than 2,300 aviators and aircrew in aviation survival each year,” she stated. “So it’s important to maintain a comfortable training environment for students. You can’t concentrate on

learning lessons when you’re shivering during winter months.”

“I expect this center will receive many visitors in the future from commands seeking similar benefits from renewable energy,” added Valentin. “Congratulations to everyone associated with this impressive project.”

The Basics About Aviation Survival Training Center Jacksonville

ASTC Jacksonville is one of eight such centers within the Naval Survival Training Institute (NSTI), which is a component of the Navy Medicine Operational Training Center based in Pensacola, Florida. The other seven ASTCs are located at Patuxent River, MD; Norfolk, VA; Cherry Point, NC; Pensacola, FL; Miramar, CA; Lemoore, CA; and Whidbey Island, WA.

The mission of NSTI is to provide safe, effective, and relevant aviation survival and human performance training as the execution arm of the Naval Aviation Survival Training Program (NASTP) which is mandated by the Chief of Naval Operations (CNO). The focus of this training is to enhance the operational readiness of the joint warfighter, to include designated aviators and aircrew (joint and allied), student aviators and aircrew (joint and allied), contract pilots, selected passengers, project specialists, VIPs, and non-aircrew from the U.S. Marine Corps. Naval aviation survival training emphasizes mishap and acci-

dent prevention, enhancing and sustaining performance, and mishap survival. NSTI strives to provide the most up-to-date, operationally relevant training possible. By CNO direction, the NASTP Model Manager (NASTP-MM) conducts annual Site Safety and Standardization Inspections, Training Quality Assessments, and Quality Assurance and Revalidation Inspections of all eight ASTCs to ensure safety and standardization of operations. The NASTP-MM provides a central point of expertise for all NASTP issues.

ASTC Jacksonville serves as the Training Agent for Aviation Survival Training and the subject matter experts on all military operational medicine. ASTC Jacksonville provides aviation survival and safety training for Navy and Marine Corps Aviation and supports all Department of Defense activities. Training includes classroom or squadron lectures, simulator devices, and a curriculum that emphasizes hands-on exposure to survival skills.



Twenty of the 168 solar thermal panels peek over the roof of the ASTC. The system replaces a portion of NAS Jacksonville's aging and inefficient steam heating grid.

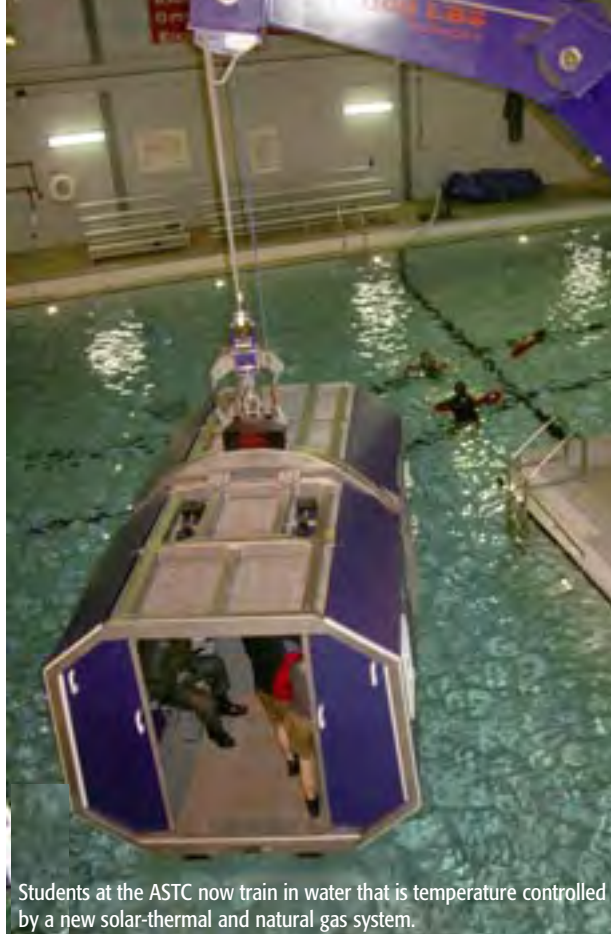
Clark Pierce

Former NAVFAC Southeast Commanding Officer Capt. John Heinzl highlighted the perspective from former Commander Navy Region Southeast Adm. Tim Alexander during the October 2010 ribbon cutting ceremony. "Adm. Alexander's top three priorities," said Heinzl, "are encroachment, excess infrastructure and energy. He considers this solar project to be a major improvement within the tri-base area. It was great to see the nexus of commands that made this project happen—from the



Rear Adm. Eleanor Valentin, commander, Navy Medicine Support Command discusses the poolside infrared heaters with NAS Jacksonville Resource Efficiency Manager Cliff Plante.

Clark Pierce



Students at the ASTC now train in water that is temperature controlled by a new solar-thermal and natural gas system.

Public Works Department to the headquarters elements of BUMED, NAVFAC Southeast and NAS Jacksonville. My hat is off to our contractor partners Teco Energy, Energy Systems Group, and Florida Solar for their commitment to innovation, safety and quality."

ASTC Jacksonville Director Lt. Cmdr. Frank Ormonde stated the expected savings in his facilities' energy usage has actually doubled since the obsolete steam heating system was replaced by an integrated solar thermal and natural gas system.

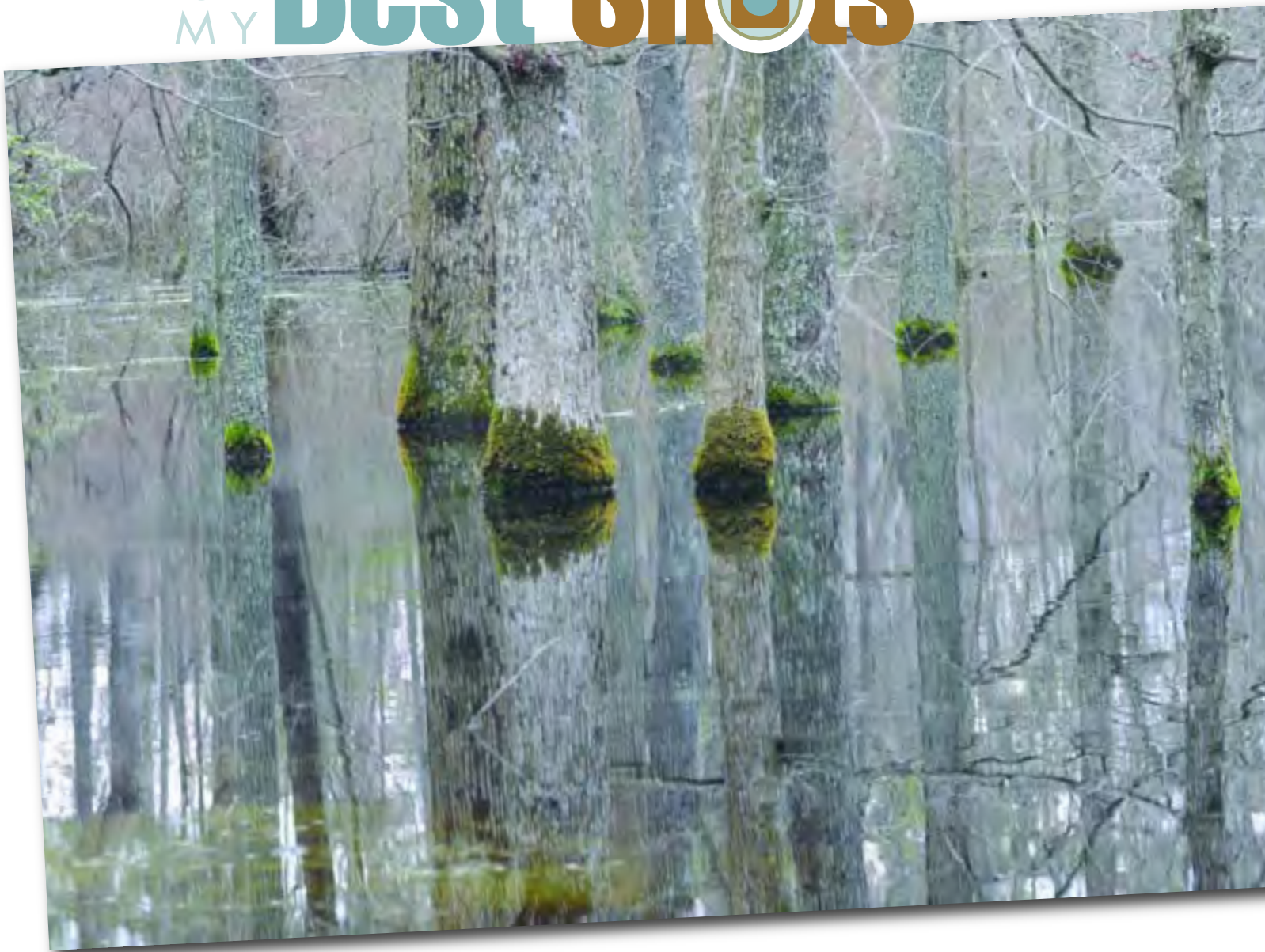
ASTC Jacksonville is one of eight such centers in the Navy and the first to implement such a major renewable energy project. ⚓

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ONE OF MY Best Shots



BEST SHOTS SHARE CONSERVATION STORY

I took my photo of this forested vernal pool during a March survey for salamanders at Naval Weapons Station Yorktown, Virginia. The survey data support Yorktown's Integrated Natural Resource Management Plan, an important tool for base stewardship decisions. The Department of Defense Partners in Amphibian and Reptile

Conservation (DoD PARC) program helps to support reptile and amphibian management work. For more information about the DoD PARC program, visit www.dodnaturalresources.net/DoD-PARC.html.

This photo was taken with a Nikon D300s camera with a 105 mm f/2.8 lens.

Paul Block ● Ecologist ● Naval Facilities Engineering Command Atlantic ● paul.block@navy.mil

Submit your own Best Shot to Bruce McCaffrey ● *Currents'* Managing Editor ● brucemccaffrey@sbcglobal.net

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